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THE IRON TRADE REVIEW

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Business Improves Slowly

New Prices on Finished Materials Not Tested—Railroad Buying Slow—Heavy Orders for Machine Tools for Export

Moderate improvement characterizes the finished material market in nearly all products, but evidence of strong competition and willingness in some cases to shade prices has not disappeared. Railroad buying continues to be disappointing. The placing of an order for 20,000 tons of steel rails by the Illinois Central railroad with the Algoma Steel Corporation, following the placing of tonnages with the Canadian mill, aggregating about the same amount, is an indication of what European mills would be able to do if not prevented by war conditions.

The Steel Corporation's operations continue to be about 65 per cent of ingot capacity, the same as for the preceding week. Pig iron production in February was 1,666,592 tons, a gain of 75,568 tons, compared with January. The number of stacks in blast shows an increase of 14. Increased production is due almost entirely to greater activity of steel works or non-merchant furnaces.

Ferro Manganese

Somewhat more definite assurance of shipments of ferro-manganese from England are being given, but it is evident that shipments will be limited. The Steel Corporation is taking care of some of its competitors who are short of supplies of ferro-manganese. This liberal policy is being highly commended.

Machinery

Although orders due to the European war still make up a very large percentage of the machine tool business being booked by American plants, an encouraging feature is the more liberal buying by the railroads. The Santa Fe, Erie and several other lines have made purchases during the past few days. There is much excitement concerning the placing of orders for export and reported orders for shells make a tremendous aggregate. Some Cincinnati manufacturers of lathes are complaining of a shortage of labor.

Structural Material

Structural awards during the past week have been more encouraging than for some time and include 13,000 tons for elevated railroad work in Brooklyn, awarded to the American Bridge Co.; 9,000 tons for the interstate bridge at Portland, Ore., of which 7,700 tons were awarded to the American Bridge Co. and the remainder to the Northwestern Steel Co.; the Clark avenue bridge, Cleveland, 9,500 tons, awarded to the King Bridge Co., which has placed the order for the steel with the Carnegie Steel Co. It is interesting to note that although the American Bridge Co. was an unsuccessful bidder for the Clark avenue bridge, steel of a Steel Corporation subsidiary will be used.

Prices

The 1.15c, Pittsburgh, quotation on plates, shapes and bars, effective March 1, is being pretty generally adhered to, but will not be fully tested for several weeks. On recent orders of large tonnages of shapes and plates for ship, railroad and other work, low prices are reported. It is evident that the awards are the result of protection on the steel given before the new price schedule became effective. Extras on galvanized wire products have been advanced $2 per ton by some companies on account of the high price of spelter, but at least one independent company has not advanced and is supplied with spelter to meet its requirements for six months.

An American Crane for Norfolk

Navy Department Not Taking Any More Chances on Foreign Workmanship —Four American and Three European Firms Compete

AT LAST American builders are to be given a chance to furnish heavy machinery to the United States government. Bids were opened in Washington on Saturday for a 150-ton floating crane for the Norfolk navy yard and there is every indication that a contract will be made with the Wellman-Seaver-Morgan Co., Cleveland, the low bidder, for $323,750. As a result of the facts brought to light by The Iron Trade Review in connection with the ill-fated German-built floating cranes for the Panama canal, the navy department is not going to take chances again by waiving important items in specifications for the benefit of foreign manufacturers. Evidently, the department feels it did quite enough in twice postponing the letting to give our highly civilized brothers in Europe a chance to get their proposals ready. We have yet to hear of cases where lettings of this kind have been postponed to favor American manufacturers.

Also it is refreshing to note that the publicity devoted to this subject brought about the submission of seven bids as against three in the case of the Panama cranes. Four American firms competed and now that it is evident our business men have a chance to get a square deal, there is little doubt but that they will take much more interest in government work than they have in the past.

The benefits of a sensible tariff also are clearly demonstrated in this instance. In the case of the Panama cranes, the tariff did not apply; American builders have no more protection on canal business than they have in China—not as much, in fact, for the Celestials are favorably disposed toward our products, being heedless of the wishes of citizens of the hyphenated variety.

THANKS to the ingenuity of American manufacturers and an equal opportunity in the bidding, the United States navy is going to have a United States made crane for its yard at Norfolk, Va., unless all signs fail. The national disgrace thrust upon the country through the purchase of two German cranes for the Panama canal, one of which neither lived up to specifications nor stood the test required, has been partially wiped out.

Out of seven bidders on a 150-ton floating crane, there were four American and three foreign makers represented, and taking the tariff duty into consideration every one of the American bids was under any submitted by foreign makers. Each bidder offered tenders entirely in accordance with specifications, and with the American manufacturer given a fair chance in this direction he proceeded to show the stuff of which he is made; likewise the good stuff he makes.

With a bid of $323,750, the Wellman-Seaver-Morgan Co., Cleveland, put in the lowest figure. This figure calls for a crane in complete accordance with the navy department's specifications. Had it been given a similar show on bids for the two big Panama canal cranes, its figures would have been no higher than those of its successful competitor, the Deutsche Machinenfabrik of Germany. Unlike the one furnished by the latter, any American crane would have stood the test without a quiver. The German company submitted bids on the 150-ton crane, through its agents, Neumeyer & Dimond, New York City, putting in a figure of $439,500, or $115,750 more than the Wellman-Seaver-Morgan figure, the specifications being identical.

Had the German company been successful, the humiliating spectacle of having the crane built in the United States under a German patent would have been witnessed. That would have been necessary owing to the war. Evidently it was appreciated by this company that if it secured its material and workmanship in this country it must have a considerably higher figure than if the material and workmanship were all-German. But even at that the tariff duty although vigorously slashed by the Underwood-Simmons law, would have shut it out from competition with American makers when the bidding was placed on a square plane.

Will Gladden American Hearts

THE bids were opened last Saturday in the yards and docks division, and the outcome in its entirety was most refreshing to the believer in American-made goods for America. It will gladden the American heart of "Old Hook'er to the Biler".

The bids are given in the accompanying table.

A glance at the figures will show that with a single exception, every one of the American bidders was well under the $400,000 mark, while, on the contrary, every one of the foreign bidders was well over that figure. The Morgan Engineering Co. bid called for the makers' design, for which it named a price commensurate with the cost of construction involved. Taking into consideration the tariff duty of 20 per cent, the bid of Werf Gusto, made through A. F. Smelders would be increased from $380,000 to $456,000, and even this does not include any legal formalities necessary. The $400,000 bid of the Shipbuilding & Engineer Co., Haarlem, Holland, would be increased to $480,000 by the tariff duty, for all of the bids by foreign makers were exclusive of tariff duty. When one recalls the just and fair duty of 45 per cent which prevailed under the Payne-Aldrich tariff one realizes still more thoroughly what the American maker can do when given proper protection and is allowed to meet foreign competition on a fair basis in bidding.

The bid of Werf Gusto, moreover, was informal in its nature, because it would have been necessary for a representative of that maker to come to Washington and discuss details, as pointed out in a letter accompanying his bid and tomes of correspondence, plans, specifications, etc.

Gave Foreigners Every Chance

CERTAINLY if ever foreign bidders were given a wide open chance to win laurels from their United States competitors it was in connection with these bids. Through an extreme deference of the

navy department, the opening of these bids was postponed twice in order that foreign bidders could get their figures here, the war having disrupted the mail service from abroad. It is difficult to conceive why the navy department should postpone the opening of bids for the convenience of foreign manufacturers. If this policy is to be pursued the department may as well not provide any scheduled day for the opening of bids, but to run at the head of the specifications in big letters:

"Bids to be Opened at Convenience of Foreign Makers."

This would help the foreign bidders in more ways than one. For instance it would place the American bidder at added cost through delay after he had prepared and submitted figures. There is another element in the situation which denotes the danger of delaying bids for foreign makers at this particular

Summary of Bids for Norfolk Crane

Bidders.	Item 1.	Item 2.	Item 3.
Wellman-Seaver-Morgan Co., Cleveland, O.....	$323,750	$299,000	$13,800‡ 7,500§
Bethlehem Steel Co., South Bethlehem, Pa.	353,000	.....	6,000
Alternate	425,000	.....	6,000
*A. F. Smelders, Schniedam, Holland.....	380,000	.....	4,000
Shipbuilding & Engineering Co., Haarlem, Holland, (A. H. McKay, agent)..	400,000	.....	12,500
Cleveland Crane & Engineering Co., Wickliffe, O.	422,990	.....	10,700
†Neumeyer & Dimond, agent, New York, N. Y.	439,500	450,000	2,150
Morgan Engineering Co., Alliance, O.	.....	381,985	10,000

*Bid for Werf Gusto, Schniedam, Holland.
†Agent for Deutsche Machinenfabrik of Duisberg, Germany.
‡From Item 1.
§From Item 2.

Item 1.—Net price delivered Norfolk as per navy's design.
Item 2.—Net price delivered Norfolk as per bidder's design.
Item 3.—Amount to be deducted for substitution of lead coating in place of bituminous coating.

time. The department would be in a pretty predicament if it accepted the bid of a foreign maker, and the latter should proceed to fill the contract only to stop because of an international complication. Uncle Sam would be left with the bag to hold, and would be forced to ask the American maker whom he turned down to manufacture the crane.

Details of the Crane

THE bids submitted on the crane call for delivery at the Norfolk yard. The amount authorized by congress for the crane was $450,000, so with the exception of the German maker none of the foreign bidders was within this figure, when the tariff duty is taken into account. The department specifications call for, "an electrically operated floating derrick or crane, with one main hoist of a lifting capacity of not less than 150 gross tons (336,000 pounds) or two main hoists of a lifting capacity of not less than 75 gross tons (168,000 pounds) each and an auxiliary hoist of a lifting and, if not fixed, a traveling capacity of not less than 25 tons (56,000 pounds), complete in all respects and in perfect working order for continuous operation. The total maximum working hook load when the main and auxiliary hoists are both in use is not to exceed 150 tons. The structure is to consist of a floating pontoon or barge carrying a revolving crane having one or two main hoists and an auxiliary hoist of specified capacities, and containing boiler and engine-driven electric generator, with machinery operated in general by electric motors. The jib or boom shall be capable of movement in a vertical plane and of being rotated around a vertical axis. The crane is intended for lifting, handling and moving guns, turrets, armor plates, boilers and other heavy material to and from cars, wharves and ships and must possess in a high degree safety, stability, reliability, durability and ease of manipulation. The crane shall be of such form and dimensions that the main hoist hook or hooks when loaded with 150 gross tons shall move freely between elevations of 90 feet above and 25 feet below the surface of the water, and through a horizontal distance of 62 feet 6 inches beyond the two side fenders and approximately the same distance beyond the end fender of the pontoon and revolve 360 degrees. The auxiliary hoist hook when loaded with 25 gross tons shall move freely between the elevations of 130 feet above and 25 feet below the surface of the water and through a horizontal range not less than that of the main hoist. In hoisting the above weights the crane jib shall clear the side of a wall-sided ship lying across the end or alongside of and in contact with the pontoon when this side is 70 feet above water. When the main hoists are fixed, the jib or boom must be capable of moving vertically and rotating with full load weights without moving ship or pontoon."

Booklet on Pipe

An unusually interesting and profusely illustrated booklet entitled "Quality Pipe" has been issued by the Youngstown Sheet & Tube Co., Youngstown, O. The method of manufacturing Youngstown pipe is fully covered, an effort being made to show how the quality of the material is maintained at a uniform high standard. The booklet includes an interesting table showing the size and capacity of the Youngstown company's plant. It is stated that the area of the buildings in the plant aggregate 6,359,760 square feet. The annual consumption of iron ore is given as 1,500,000 tons and the daily consumption of gas as 200,000,000 cubic feet. The plant has an annual bessemer and open hearth steel ingot capacity of 1,250,000 tons and an annual sheet bar, billet and slab capacity of 1,000,000 tons. The yearly capacity of the tubular goods department is 500,000 tons, not including wrought iron pipe, of which 40,000 tons are made annually.

A dispatch from Quakertown, Pa., states that the Bethlehem Steel Co. has acquired additional land in that vicinity, including 125 acres from Charles Reidenhauer and 90 acres from Samuel Bergstresser. The land is located along the North Penn railroad, which offers an outlet to tidewater and 16 miles from the main plant of the Bethlehem Steel Co. What use will be made of the land has not been announced.

Order Books Burst Wide Open

Tremendous Volume of Business Flows Into Plants of Machine Tool Manufacturers—Scouring the Country for Men—War Orders Heavy and Domestic Business Better

THE machinery market of the United States was very active during February. From the point of view of business booked, the month was the most satisfactory since the outbreak of the war, and a number of large machine tool interests say February was the largest month they ever experienced. Most of the business originated in the requirements of the belligerent powers in Europe. All through the month, and particularly the latter part, the demand for machinery for direct export to Russia, England and France was of large proportions; there also was a good demand from neutral countries in Europe, which, however, involved practically the same class of machinery as ordered by the belligerents. A feature of the export trade is the tightening up in the shipping situation; a good many shippers find it almost impossible to secure space in vessels.

Outside of the business for direct export, the bulk of the orders of the month came from domestic manufacturers who have booked contracts for war materials. There now is more excitement over war business than ever. One machine tool house, for instance, reports that it is figuring on equipment with more than 200 concerns in different parts of the country which, in turn, are figuring on shrapnel and other war material contracts.

Many Have War Orders

AMONG the companies which have taken such contracts during the month is the Crucible Steel Co. of America, which is reported on good authority as having very recently booked through J. P. Morgan & Co. $150,000,000 worth of shells for shipment to England. The New York Air Brake Co., the Baldwin Locomotive Co., the Imperial Steel & Wire Co., Collingwood, Ont., the Safety Car Heating & Lighting Co., 2 Rector street, New York; the Groton Bridge Co., Groton, N. Y., and many other concerns are figuring on equipment for making shrapnel. The Westinghouse Air Brake Co. is about to close on a large amount of equipment of this character, as also is the Westinghouse Electric & Mfg. Co. The Traylor Engineering & Mfg. Co., which secured a shrapnel contract the early part of the month, bought 87 turret lathes and a large quantity of other equipment; this company is planning practically to duplicate this purchase if it closes another contract on which it now is figuring. The E. W. Bliss Co. and the Bethlehem Steel Co., which were among the first companies to get shrapnel contracts, again were large buyers of machinery during February. The Pratt & Whitney Co., Hartford, Conn., also has re-entered the market on a large scale.

The continued demand from such concerns has rendered very acute the scarcity of turret lathes, engine lathes and some other kinds of machines used in making war material. All machine tool manufacturers equipped to make such machines are operating in most cases night and day and are booked far ahead. A great many such plants are employing larger forces of workmen than ever before in their history and continue to enlarge their staffs as fast as the men can be secured. Some interesting production records are being achieved at many of these plants. From Cincinnati it is reported several plants which usually make planers and shapers are discontinuing their regular products temporarily and instead are turning out parts for lathes and radial drills. Manufacturers of cylindrical grinders and of the larger sizes of automatics are very busy, as also are manufacturers of some kinds of milling machines.

What Subtraction Shows

WHEN this war business is subtracted from the total, the remainder is found to be of rather small proportions. In purely domestic business, however, there is a perceptible and consistent improvement. Various ship builders on the Atlantic coast, for instance, have been buying more liberally and have good-sized requirements pending, so that machinery sellers are finding it well worth while to keep in close touch with such concerns. Miscellaneous manufacturing companies also are better buyers; in the east, for instance, the General Electric Co., Schenectady, N. Y.; the Elevator Supply & Repair Co., New York; the Visayan Oil Co., New York; the Consolidated Railway, Electric Light & Equipment Co., Bayonne, N. J., and numerous other concerns have placed, or shortly will place, good-sized orders.

A highly satisfactory feature is a slight improvement in the volume of demand from the railroads. Railroad purchasers during the month included the Santa Fe, the Erie, the Philadelphia & Reading, the Central of Vermont, the Southern Pacific and a few others. Outside of the requirements of the Southern Pacific, the purchases were not of much importance. During the month the Lake Shore & Michigan Southern inquired for a wheel-press and a car wheel lathe; the Delaware, Lackawanna & Western for a vertical milling machine and a 90-inch driving wheel lathe; the Norfolk & Western for a lathe; the New York Central for a driving wheel lathe, and the Atlantic Coast Line for a steam hammer, radial drill, accumulator, multiple drill, sectional hydraulic flanging press, and several punches and shears. The latter company closed for its requirements on Feb. 27. The Cleveland Railway Co., Cleveland, is expected to issue a list of some 20 machine tools shortly.

Crane Builders Get Business

THE Alliance Machine Co., Alliance, O., booked a contract for two large cranes from the Maryland Steel Co. The Bethlehem Steel Co. placed 17 cranes for its bridge shop extension with the Pawling & Harnischfeger Co., Milwaukee. Outside of these features there was no particularly prominent business in the crane market. The Youngstown Iron & Steel Co., Youngstown, O., which is building a new open hearth steel plant, is expected to ask for bids shortly on rolling mill and motor equipment. The general superintendent of the Hangyeh Ping Iron & Steel Co., China, who several weeks ago sailed for London after inspecting a number of plants in this country, is expected to return to New York shortly to issue formal inquiries for a considerable quantity of rolling mill, steel plant and blast furnace equipment.

MEN OF MACHINERY TRADE

Who they are Where they are What they are doing

Chauncey B. Heath, of Boston, Mass., has been appointed general sales manager for the Bantam Anti-Friction Co., Bantam, Conn., with headquarters at Bantam.

Henrik Greger, recently associated with the Epping Carpenter Pump Co., Pittsburgh, Pa., as assistant chief engineer, has become affiliated with The Prescott Co., Menominee, Mich., as a mechanical engineer.

E. B. Baker, formerly with the Carpenter Steel Co., Detroit, is making preparations to open an office in Detroit to represent several machine tool manufacturers. His present address is Box 203, Detroit.

Fred J. Miller, a well-known mechanical engineer and general manager of the Remington Typewriter Co.'s factories, has been elected a member of the Simplified Spelling Board, New York City, an organization having for its object the reformation of English spelling by the elimination of silent and useless letters.

Prof. Emeritus Robert Hallowell Richards, of Massachusetts Institute of Technology, Boston, is to be the recipient of a gold medal from the Mining and Metallurgical Society of America at a special meeting of the society to be held in the middle of March. Its award will be accompanied by a testimonial in recognition of the services of the veteran teacher in the advancement of the art of ore dressing.

Wm. H. Hulick, of New York City, has been re-elected president and treasurer of the Warren Foundry & Machine Co., Phillipsburg, N. J. A. D. Chidsey was made vice president and assistant treasurer for the ensuing year; A. L. Riley, secretary and James Ingham, superintendent. The directors elected were Messrs. Hulick, Chidsey and Ingham, E. J. Fox, John S. Riegel, Chester Snyder and W. Clayton Hackett. Messrs. Hackett and Snyder are new directors.

Kate Gleason, secretary and treasurer of the Gleason Works, Rochester, N. Y., has won the distinction of being the first woman admitted to the membership of the American Society of Mechanical Engineers. Miss Gleason took a mechanical engineering course in Cornell University and received practical training in the plant of her father, William Gleason, in designing, building and selling machinery. At present she is reorganizing the Ingle Machine Co. Her specialty is designing gearing and estimating its cost.

Thomas S. Grubbs, for some years auditor and secretary of the Westinghouse Machine Co., East Pittsburgh, Pa., has resigned and has been elected secretary and assistant treasurer of the Union Switch & Signal Co. George F. White, also of the Westinghouse Machine Co., has resigned and has been elected assistant secretary of the Union Switch & Signal Co.

Eduardo Perez de Lara, agent for the statistical department of the regulating commission, Henequen, Sisal market, Merida, Yucatan, Mexico, is on a two-months' trip in the United States visiting manufacturers of machinery. He is anxious to see if some special machinery can be made to manufacture burlap carpets and wall coverings, for which a special grade of hemp is used that is said to be fireproof. He has visited manufacturers in New York and Worcester, Mass., and will also make a trip through the middle west.

Walter Alexander, district master mechanic of the Chicago, Milwaukee & St. Paul railway, has been appointed a member of the railroad commission of Wisconsin to succeed David N. Harlowe, former traffic manager of the Allis-Chalmers Mfg. Co., whose term expired Feb. 1. Mr. Alexander is the first practical railroad operating official to be appointed to the commission, which consists of three members, one of whom is to represent the transportation interests of the commonwealth. He is a graduate of the college of engineering, University of Wisconsin, in which he was instructor following his graduation.

Ira A. Minnick was elected president of the National Boiler and Sheet Iron Works, Indianapolis, at a recent meeting of the directors and stockholders, to succeed Edward Gerrard, who wished to retire from active administration of the company's affairs. Mr. Gerrard retains stock in the company and his son, A. C. Gerrard, becomes secretary, succeeding L. A. McDonald, who becomes vice president. Mr. McDonald retires from the office of secretary after having served in that capacity for five years. As vice president he will continue actively in the business as in the past. It is announced that there will be no change in the policy of the company.

Wm. H. Hart, who for the past 60 years has been head of the Stanley Works, Hartford, Conn., manufacturers of cold rolled strip steel, tendered his resignation from this office at a meeting of the board of directors recently. The directors accepted Mr. Hart's resignation and appointed him chairman of the board of directors, a newly created office. Mr. Hart is succeeded by Geo. P. Hart, his son, who for the past 12 years has been vice president of the concern. The other officers are: Vice president, E. Allen Moore; treasurer, L. Hoyt Pease; secretary, H. B. Humason. Walter P. Hart was chosen to fill the newly created office of assistant secretary.

M. C. Maxwell, for the past seven years head of the department of applied machanics at Pratt Institute, Brooklyn, N. Y., and a consulting engineer, is now identified with the Yale & Towne Mfg. Co., Stamford, Conn. He is superintendent of power and plant of that company, and is responsible for the power generation and distribution, the building maintenance, all new building construction, the general repairs and maintenance of all machinery, shafting, etc., throughout the plant. He also has charge of the tool department and is responsible for all tool designing, the machine shops for building tools, jigs, fixtures, dies, gages, etc., and the forge shop.

J. W. Wells and son, R. W. Wells, principal owners of the Wells-Lloyd Tubing Machine Co., Menominee, Mich., have sailed from Seattle for China with the object of disposing of the right to the manufacture and sale in Asia of the Wells-Lloyd tubing machine, invented five years ago by M. B. Lloyd. In June last year the company, which has its principal offices at Menominee, Mich., sold the exclusive American rights to the machine to the Elyria Iron & Steel Co. of Elyria, O., which took over the plant in Menominee and is still operating it. The Messrs. Wells intend to be absent from Menominee for six or eight months. They planned to go to Europe in July, to dispose of the European rights, but the outbreak of the war prevented.

THE OPEN HEARTH

Shameless Subserviency to Foreigners

THE story of a national disgrace—of how a crane made in Germany, purchased by the United States government for the Panama canal, not built according to specifications and not finished on time, collapsed while being tested—was published in *The Iron Trade Review* of Feb. 4. This crane was purchased and paid for by American money while thousands of skilled American workmen walked the streets begging for work. In publishing this story, we remarked, "It is high time for the American people to wake up and realize that in many high positions in the government service we have men who are either too short-sighted or too stupid to understand the meaning of the word 'patriotism'," but we really did not suppose that any officials at Washington, after getting the jolt which the collapse of the crane gave them, would continue to show favoritism toward foreign manufacturers. A few days ago, however, it was admitted by an official at Washington, in conversation with the Washington correspondent of *The Iron Trade Review*, that the calling for proposals for another big crane had been twice postponed because certain foreign makers were not ready to submit their bids.

In striking contrast with the facts about the purchase of the crane and the awaiting of the convenience of foreign makers is the intensely interesting story, told on another page of this issue by P. B. McDonald, a mining engineer, illustrating how Germans are always on the alert to do anything to promote the welfare of their manufacturers and their country. The rocky little island off the storm-beaten coast of Newfoundland was not overlooked by the Germans, because they needed its valuable iron ore deposits to make guns. The Canadian manufacturers found to their amazement that the Germans were thoroughly familiar with the underground workings of the mines, knew even the costs of mining and had excellent maps of the mines.

Intense patriotism which is responsible for the Germans collecting detailed information about mining and manufacturing throughout the world is one of the most important factors in enabling the German empire to make in the greatest war of history a fight which is astonishing the world.

What have the American people to say about the lack of patriotism and sound business sense of Washington officials? Fortunately, in the case of the second crane, American manufacturers have been able to submit bids lower than those of the foreign competitors, but this fact does not excuse the attitude of unamerican, unpatriotic and shameless subserviency to foreigners recently exhibited at the national capital.

Selling Tools in Europe

IN THE export branch of the machine tool industry, the outlook at present is exceedingly complicated. Prior to the beginning of the war, American manufacturers of all kinds of machinery were enjoying a European demand which displayed a healthy growth from year to year. With the normal trade channels now in large measure obliterated, it appears likely that at the conclusion of the war new conditions will present themselves everywhere, and changed conditions of competition probably will prevail in various portions of the European market. American manufacturers will have to adjust themselves to these changes. As long as American machine tools, however, remain in the ascendancy in design, workmanship and efficiency of operation, there will continue to be a big demand from abroad. In some quarters it is believed our machine tool exports after the resumption of peace will grow more rapidly than ever.

Elsewhere in this issue appears an article which takes up several factors which have had an important bearing on the export trade of the past and which must be considered in preparing for the export trade of the future. This article deals with the selling methods on which American machine tool manufacturers have been depending to care for the European market. The article points out some of the disadvantages of these methods. It also describes briefly recent tendencies in European machine tool design. It is the intention of *The Iron Trade Review* to follow this article with other articles, to appear from time to time, dealing with various phases of the development of the

THE OPEN HEARTH

export market in machine tools. The purpose of these articles will be to consider the factors that influence the ebb and flow of foreign business and it is the desire of *The Iron Trade Review* to amplify this theme with comments from its readers.

Bope, The Patriot

STRONG faith in one's country is absolutely necessary nowadays as the foundation for optimism. Col. H. P. Bope belongs to that class of Americans who never lose faith in their country. The latest manifestation of this fact was found in the eloquent speech which he delivered last week at the dinner of the Traffic Club in Chicago. The colonel believes the future is full of promise for many reasons, but most important of all, as he expressed it, "are the growing needs of a great country, far from now being fulfilled, and of a great destiny, far from being completed." He is not afraid to express his deep and abiting faith in the future of this country.

The United States cannot have too many men of the intense patriotism of Col. Bope. May his tribe increase!

Not Easy to Make Shells

ASIDE from ethical considerations, which after all do not seem to have weighed heavily in most cases, the manufacture of shrapnel or shells of other kinds for shipment to Europe is not to be entered into lightly. Owing to the tremendous orders which have been placed for war munitions, particularly shrapnel, during the past 60 days the machinery industry has become somewhat excited over the possibilities for large profit and it seems that the time has arrived to sound a note of warning before some manufacturers venture into the shell game with disastrous results.

It is a mistake to think that any shop equipped with a few lathes, drills and other machine tools can go into the shrapnel business without any preliminary preparation or special organization. The unusually heavy orders for new and powerful machine tools which the holders of shrapnel contracts have been obliged to place form in themselves a rough measure of the difficulties and expense connected with ventures of this character. For the manufacture of shells, unusually powerful machines equipped to turn out exceptionally accurate work at high speed are required. Automatic or semi-automatic lathes of a powerful type are practically indispensable. The limits of accuracy are close and every shell is carefully inspected by a military representative before it is accepted. In some cases it is understood the rejections owing to faulty workmanship have practically wiped out the profits on the material which was accepted. Shrapnel and other shells provided with time fuses are of complicated construction and the timing device in particular should be given careful attention. It has a large number of parts and must be built with the precision of a watch. Therefore, although huge sums of money are being made at present in the manufacture of ordnance, the newcomer in this field must weigh the question from all sides and be sure that his organization and equipment are equal to the task before affixing his name to any contracts.

Little to Fear

SEVERAL of the largest machine tool dealers and manufacturers in the east have taken a commendable step to protect their export business. They have decided to require payment for tools going abroad upon their delivery to public warehouses in New York instead of upon the delivery of the ship's papers to the agent of the purchaser, as heretofore has been the custom. This makes it certain that regardless of the shipping situation, machine tool manufacturers or dealers with export orders will not be prevented from delivering their goods and obtaining payment. If it should turn out that ships cannot be obtained to forward the machines across the Atlantic, the loss will have to be borne by the purchaser. Under the new arrangement, as soon as the tools are delivered to the New York warehouse, the seller can obtain his money upon the surrender of the warehouse receipt to the bank, since in every case adequate bank credits have been established in the United States. This is a sensible precaution.

Prices Present and Past

Quotations on leading products today, average for last month, average for three months ago and average for March 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Today's prices.	Average for Feb., 1915.	Average for Dec., 1914.	Average for Mch., 1914.
Bessemer pig iron, Pittsburgh	$14.55	$14.63	$14.70	$15.15
Basic pig iron, Pittsburgh	13.45	13.45	13.45	13.96
No. 2 Fdy. pig iron, Pittsburgh	13.80	13.70	13.70	14.09
Northern No. 2 Fdy., Chgo	13.00	13.00	13.00	14.25
Lake Superior Charcoal, Chgo	15.75	15.75	15.75	15.50
Malleable, Bessemer, Chgo	13.00	13.00	13.00	14.25
Southern No. 2, Birmingham	9.50	9.50	9.50	10.50
Southern Ohio No. 2, Ironton	12.75	12.75	12.63	13.00
Basic, eastern Pa.	14.00	14.00	13.50	14.25
No. 2X Virginia furnace	12.50	12.50	12.50	12.75
No. 2X Foundry, Philadelphia	14.50	14.25	14.25	15.00
Ferro mang. Balti. (prompt)	100.00	100.00	68.00*	38.00
Billets, Pbgh.	20.00	19.50	18.50	21.00
Sheet bars, Pbgh.	20.50	20.60	19.00	22.00
Steel bars, Chicago	1.34	1.045	0.95	1.17
Steel bars, Pittsburgh	1.15	1.10	1.10	1.20
Iron bars, Philadelphia	1.125	1.12	1.12	1.27
Iron bars, Cleveland, local del'y.	1.15	1.15	1.15	1.25
Iron bars, Chgo. mill	1.10	1.31	1.20	1.38

*Nominal

	Today's prices.	Average for Feb., 1915.	Average for Dec., 1914.	Average for Mch., 1914.
Beams, Chicago	$1.34	$1.31	$1.20	$1.43
Beams, Pittsburgh	1.15	1.10	1.11	1.20
Beams, Philadelphia	1.309	1.25	1.20	1.30
Tank plates, Pittsburgh	1.15	1.10	1.09	1.20
Tank plates, Chicago	1.34	1.28	1.25	1.38
Tank plates, Philadelphia	1.309	1.25	1.20	1.30
Sheets, blk., No. 28, Pittsburgh	1.80	1.80	1.80	1.95
Sheets, blue an., No. 10, Pbgh.	1.30	1.30	1.30	1.40
Sheets, galv., No. 28, Pbgh.	3.40	3.01	2.80	2.95
Wire nails, Pittsburgh	1.60	1.55	1.50	1.59
Connellsville fur. coke contr.	1.65	1.65	1.70	2.00
Connellsville fdy. coke, contr.	2.25	2.25	2.25	2.50
Heavy melting steel, Pbgh.	12.00	11.55	10.06	12.37
Heavy melting steel, east'n Pa.	10.50	10.50	9.50	11.50
Heavy melting steel, Chgo.	9.75	9.44	8.25	9.81
No. 1 wrought eastern Pa.	12.00	12.00	11.50	14.00
No. 1 wrought, Chgo.	9.00	8.81	7.50	9.00
Rerolling rails, Chgo.	10.00	9.50	9.50	11.19
Car wheels, Chgo.	10.00	10.00	10.00	11.75

(For Additional Prices See Page 494.)

Pig Iron Exported More Freely

Despite War Complications, Shippers Arrange for Movement of Moderate Tonnages—Many Foreign Inquiries Are Pending—Domestic Demand Light

New York, March 2.—Export sales for moderate quantities of pig iron have been more widely scattered among sellers the past week, indicating the ability of the latter to obtain more favorable rates on freight room at least for limited tonnage. Sellers usually require a rate of less than 45s to Mediterranean ports to put through business. Some shipping companies still are quoting 60s for that destination, but considerably less can be done where the tonnage is not large. Additional sales of iron for export noted this week total about 3,000 tons of northern and southern foundry and northern hematite for Italy and some small lots to England and to other foreign countries. The domestic market moves slowly. A Long Island sound stovemaker bought 2,000 tons of Alabama grades. A New Jersey pipemaker placed 2,000 to 3,000 tons of low silicon iron with eastern Pennsylvania makers. An Elizabeth, N. J., consumer took a small lot of eastern Pennsylvania No. 2 plain at $14.10, delivered. There has been some basic sold for New York state delivery. Some New England buyers have been buying more freely, including some of the textile machinery manufacturers in the Lowell district. The total of such transactions has been probably 5,000 tons. Certain brands of Buffalo iron continue to be offered in New England and in this district, at $12.50 to $12.75, furnace. This iron is said to be a brand seldom openly sold on the market and probably represents a temporary policy. The New England market is quotable at about $15.08 to $15.58, for No. 2X. At tidewater prices in northern iron range from about $14.24 to $14.74 for No. 2X.

New Inquiries

Cincinnati, March 2.—A local melter is in the market for from 1,000 to 1,800 tons of foundry iron, most of which will be southern, a central Ohio melter wants about 500 tons of foundry iron, and a central Indiana manufacturer is out for about 1,000 tons of foundry grades. These are the new inquiries of importance before the market. A central Ohio user is expected to close today for 1,000 tons of northern foundry iron, and the Hercules Engine Co., Evansville, Ind., will buy between 900 and 3,000 tons of northern and southern iron either today or tomorrow. The Nordyke & Marmon Co., Indianapolis, will also close in a day or so for about 800 tons of northern and southern foundry iron. An inquiry for 2,000 tons of malleable iron in central Ohio is still pending. Small sales are about the same as those of last week, showing a decided improvement over corresponding periods in either January or February. Several small sales have been made for delivery over the last half at present prices, but only one or two furnaces will accept business that far ahead. Prices are quoted at from $9.50 to $10, Birmingham basis, for southern No. 2 foundry, and from $12.75 to $13, Ironton basis, for southern Ohio No. 2 foundry, both for first half shipment.

Relight Canadian Stack

Buffalo, March 2.—The merchant blast furnace operations in the Buffalo territory are to be increased by the blowing in of the stack of the Canadian Furnace Co., Ltd., Port Colborne, Ont. There is considerable iron piled in the yards of this new furnace, started less than two years ago by Buffalo Union Furnace Co. interests, and out of blast for some time, but orders coming in warrant its relighting, which takes place on March 10.

The new business placed by consumers on the American side of the international boundary with Buffalo furnaces has been in small tonnage lots during the past week. Several thousand tons of basic were sold during the week at better than $13.50, f. o. b. furnace.

One of the large consuming inter-

(*For complete prices see page* 494.)

ests is said to be considering the advisability of entering the market for upwards of 40,000 tons of pig iron for delivery over the rest of the year. It is possible that the placement may reach, if not exceed, 50,000 tons. So far, officials of the melting interest and of the producers of this district have discussed the situation, but the actual inquiry has not materialized.

Pig iron prices are $1 a ton higher at the present time than they were last fall when 200,000 tons were placed in a single buying movement. Schedules are being adhered to with reference to higher silicon irons, although a slight easing off has been noted during the week in the lower grades of pig iron, some gray forge being quoted at $12.50.

Prices Firmer

St. Louis, March 2.—Southern pig iron at $9.50, Birmingham basis, seems to have disappeared from the St. Louis market, and local agents now are quoting $9.75 to $10, but inquiry is confined to a few car lots. Sales last week did not exceed 400 tons, nearly all southern iron. Northern iron is very little in demand. Prices remain at $13, both for Chicago and Ironton furnaces.

Shipments on contracts are quite heavy from the furnaces of the Buffalo district and particularly to the radiator makers and to some machinery producers.

Improvement Continues

Birmingham, Ala., March 1.—The improvement noted last week in the southern iron market is still in evidence and furnace interests in general are more hopeful than at any time since the beginning of the new year.

One large maker states that during February he sold 60,000 tons, considerably over his make for that month, owing to reduced operations. It seems no iron is moving for less than $9.50 to $9.75, No. 2 foundry, Birmingham. There is some inquiry for third quarter business, but it has as yet developed no orders. One maker is holding out for $10, No. 2 foundry, for third quarter, but it is apparent others are quoting $9.75.

The reports of the past week that southern iron has been sold at $9.25 seems to be an error as far as Birmingham makers will reveal the situation. One furnace operator advances the opinion that the reports probably arise from a movement of some of the iron closed for last December and stacked on the yards at $9.25.

Chicago Market Sleeping

Chicago, March 2.—Unexpected quiet has overtaken the pig iron market in Chicago and practically no inquiry has been received this week. The few small tonnages are not pressing and until greater interest is shown, the market will present little of importance. Although deliveries are increasing, indicating a somewhat greater activity in foundries, melters are slow about entering into new contracts until the situation clears and they are better able to establish their needs.

The only tonnage of importance closed within the past week was the purchase by the Kohler Mfg. Co., of Sheboygan, Wis., of about 5,000 tons of foundry and 1,000 tons of high silicon. This business was awarded to a concern representing both northern and southern interests and it is believed the foundry iron will be furnished by a Birmingham concern and a non-merchant stack at Chicago. The high silicon iron is believed to have gone to a Jackson county producer. This iron is for last half delivery.

Radiator Company's Policy

Cleveland, March 2.—With the exception of 1,000 tons each sold by Cleveland agencies to the American Radiator Co., no iron has been bought by that company from Cleveland agencies during the past few weeks and no inquiry has been received in this city, but it is understood that, as stated in *The Iron Trade Review* last week, the Radiator company will buy for its current requirements at four or five of its plants and will hold as an investment a large part of the tonnage booked last November. The Cleveland Furnace Co. last month shipped more iron than in any month since October, although there were only 24 working days in February. Other lake furnaces report that shipments for February were very satisfactory, in some cases exceeding the make. The market at present is extremely dull.

Bessemer Declines Slightly

Pittsburgh, March 2.—The average price of bessemer and basic in February was $13.60 and $12.50, valley, respectively, according to monthly figures compiled by W. P. Snyder & Co. Compared with averages for the preceding month, bessemer declined 3 cents a ton and basic showed no change in position. Tonnages involved in sales last month were light. Dealers say there is no demand of consequence for steel-making grades, and the market for foundry irons shows no snap. Specifications continue satisfactory. The Republic Iron & Steel Co. has blown in its Atlantic stack at New Castle, Pa., and it is not improbable a western Pennsylvania merchant furnace will be added to the active list in the near future.

Market Quiet

Philadelphia, March 2. — No large sales of pig iron have been closed in this territory during the past week. Transactions largely have been of the miscellaneous and small lot character. Cast iron pipe makers have continued to pick up metal, both northern and southern, as it has been offered and usually they are able to get attractive prices on the lower silicons, under such circumstances. Additional purchases of this character in the week by pipe shops in this territory have run perhaps 4,000 tons, including one fair-sized tonnage of northern. On the regular foundry grades, producers appear to be standing more firmly by their schedules, which with some of them puts No. 2X at $14 furnace, or roughly $14.60 to $14.75, Philadelphia. Some makers still will do less depending on the desirability of the order, but instances below $14.50, Philadelphia, are becoming rarer. The absence of sizable transactions obscures the present limits of the foundry market. A Reading buyer asks 500 tons of No. 1X for the next six months. There is no activity in basic for delivery in this territory, but some small lots are being taken here for western Pennsylvania delivery. The low phosphorus market also is quiet apart from the continued inquiry for export. England has inquired for an additional 1,000 tons of low phosphorus and 6,000 tons of bessemer. Italy also has before sellers in this city a new lot of 4,000 tons of southern foundry.

(*For complete prices see page* 494.)

New Orders

Do Not Show Much Expansion With Steel Corporation

New York, March 3. (By wire.)—The United States Steel Corporation's operations continue to hold around 65 per cent. At times this rate has been exceeded slightly recently, but it represents this week's activity. Since Jan. 1, 20 of its blast furnaces have gone in. New business is maintained at the recent level, but is not expanding much.

The International Great Northern of Texas gives the Tennessee company 1,500 tons of rails. Specifications for the Chilean state railway order, 8,000 tons, recently taken by the Corporation, are now being received.

Bids are in today on 3,200 tons structural for the Ocean Steamship Co. for piers at Havana.

R. V. Sage, assistant sales agent of the Cambria Steel Co., Johnstown, Pa., who resigned recently, has returned to that company.

Bar Tonnage for Bridges

Makes a Large Amount—Big Structure at Harrisburg—New Price Firm

Philadelphia, March 2.—Plans now have been issued for the large concrete bridge to be built by the Cumberland Valley Railroad at Harrisburg, bids to be received March 17, and the indications are the reinforcing bar tonnage will run a number of thousand. The structure will have 46 spans with a total length of about 4,000 feet and will provide room for two tracks. Bar makers are showing considerable interest in this project. Arthur McMullen & Co., Inc., New York, are the low bidders on the general contract for the Broad street bridge, this city, requiring 400 tons of bars. Export inquiries for bars including one lot of 1,000 to 2,000 tons and another of 300 tons still are pending. Specifications against steel bar contracts in this district the past week have been good. Consumers apparently have been ordering more freely because of the advance to 1.30c, Philadelphia, or 1.15c, Pittsburgh, effective today. All makers now are quoting this price for March delivery.

Steel Bars Are Firm

Chicago, March 2.—With the present week the steel market passes from 1.29c to 1.34c, Chicago mill, in accordance with the schedule announced by the Steel Corporation and independents several weeks ago. The dividing line, as usual, has brought a considerable tonnage of specification on previous orders to avoid tonnages being canceled at the end of the month and a number of buyers also hurrying to get under cover at the 1.10c quotation before March put an end to the option. Indications at present, as far as they can be judged, are that all steel makers are adhering to 1.34c, Chicago, on finished steel, in the effort to make the market firm. New business is not large, as the more important users were covered some time ago for first quarter.

Considerable enlargement of the hard steel bar market has taken place and mills are working on better schedule with prices at a steady level. Agricultural implement makers are showing slightly more interest and are specifying better on their contracts than earlier in the year.

Steel Bars Now 1.15c

Pittsburgh, March 2.—Steel bar makers are asking 1.15c for March and 1.20c for second quarter delivery, and, so far as can be ascertained, those figures represent the market accurately at this center. Specifications against contracts in February exceeded those taken in January by a rather broad margin, several important makers advise. Demand is not confined to one or two lines, but is described as general.

Firm at Cleveland

Cleveland, March 2.—The 1.15c, Pittsburgh, price for bars for March delivery is being adhered to in this district and offers to buy a number of carloads Monday at 1.10c were rejected by leading companies. It is recognized, however, that the price has not yet been tested. Specifications prior to March 1 at 1.10c are not heavy.

Advance Stimulates

Buffalo, March 2.—The scheduled advance in prices from 1.10c, base, to 1.15c, on March 1, stimulated specifying last week, according to the Buffalo mills and agencies. Within the past two days, some further orders have been booked at the March quotation of 1.15c. The same situation is said to have applied in the case of structural shapes and plates.

Iron Bars Hold Firmly

Chicago, March 2.—Makers of iron bars find the situation much to their liking with the memory still fresh of the low prices prevailing in January. No tendency to shade the present quotation of 1.10c, Chicago mill, is discovered, and while this is not considered a fair price for iron bars under ordinary circumstances, it is so much better than anything possible in preceding months that it seems like real business. Indications are that an advance to 1.15c, Chicago mill, will be made shortly, possibly during the present week. The backlog obtained during February is being held by all mills, and in some cases is being added to.

Hoops, Bands, Shafting

Pittsburgh, March 2.—Steel bands for March delivery are being held at 1.15c or $1 a ton above the previously prevailing quotation. Hoops are quotable at from 1.25c to 1.30c. Specifications for both products are fairly heavy, but new buying is light. Cold rolled shafting is listed at from 67 to 68 per cent off.

May Agree on Wages

To Be Paid in Sheet and Tin Plate Mills, But Labor Controversy is Not Yet Settled

Pittsburgh, March 2.—Representatives of a dozen sheet and tin plate plants which signed the wage scale of the Amalgamated Association for the year ending July 1, next, may meet with officers of that organization this week in a second attempt to adjust wages. Early last month, it will be recalled, mill managers and Association officers recommended a reduction of 11.2 per cent for sheet mill and 6 per cent for tin plate mill men, but employes refused to accept proposed cuts at a referendum election.

The Granite City plant of the National Enameling & Stamping Co., at Granite City, Ill., and the Niles, O., mills of the Brier Hill Steel Co. closed down shortly after the result of the referendum vote was announced, and it is reported the Deforest Sheet & Tin Plate Co., Niles, O., has suspended operations. Rolling schedules were resumed, however, at the Granite City mill this week.

Reports from mill towns indicate employes are anxious to have the wage question again considered. While no official announcement has been made, it is known the advisability of another expanded conference is being considered.

Officers of the Amalgamated say there is no change in the labor situation at Canton and at Massillon, O., where efforts are being made to organize men employed in sheet mills.

High Galvanized Prices

Cleveland, March 2.—The usual quotation on No. 28 galvanized is 3.40c, but 3.50c, Youngstown, has been quoted. The high price of galvanized sheets has apparently had no effect on black or blue annealed, on which keen competition for a long time past in shading of prices.

Galvanized Sheets High

Pittsburgh, March 2.—Galvanized steel sheets, which have been gradually stiffening since spelter started to advance in price, now are listed at 3.40c, for base size gage or $15 a ton above the lowest price to prevail a couple of months ago.

(*For complete prices see page* 494.)

Several independent makers had been quoting 3.40c for No. 28 gage for several days, and the American Sheet & Tin Plate Co. formally advanced prices the latter part of last week. Black and blue annealed sheets are commanding about $1 a ton above previously prevailing maximum quotations.

Eastern Business Slow

Philadelphia, March 2.—Business with eastern sheet makers still develops little betterment from week to week. While operations are maintained at a fairly full rate, the tonnage is barely enough to fill out the mill schedules and prices show no buoyancy. The open price remains 1.50c, Philadelphia, or 1.35c, Pittsburgh, for No. 10 gage blue annealed, but whether this would hold firmly on a large order, cannot be answered conclusively in view of the miscellaneous character of the present buying.

Sheets Continue Strong

Cincinnati, March 2.—The sheet market remains strong, especially that on galvanized sheets. Orders are spasmodic and scattered, but are good, considering the fact that mills will accept business for prompt shipment only because of the uncertainty of conditions brought about by the situation in spelter. Specifications on old contracts are good, and are being supplied largely from stocks. Galvanized sheets No. 28 gage are quoted at from 3.40c to 3.45c, and black sheets No. 28 gage at 1.95c, both Pittsburgh basis.

Sell No Galvanized

Chicago, March 2.—With spelter prices advancing steadily, the situation in galvanized sheets is exactly the same as a week ago, mills refusing to make quotations, as they can obtain spelter only with difficulty and at almost prohibitive prices, and will not obligate themselves under the uncertainties of the market. Warehousemen and buyers who have tonnages to specify against are disposing of their excess at somewhat under the nominal market and are making a desirable profit from the transaction. A nominal quotation of 3.59c, Chicago mill, is being made, but no business will be taken by mills at any price.

The market for blue annealed and black sheets is unchanged with small volume of trading.

Tin Plate Mills Busy

Pittsburgh, March 2.—The American Sheet & Tin Plate Co. is operating tin plate mills at about 95 per cent capacity, and independent mills are being driven practically at maximum capacity. Specifications against contracts are coming out in good volume, and shipments to all sections of the country are normal. Shipments to Pacific coast points via the canal are heavy, although considerable material continues to be carried by the railroads for Pacific coast delivery.

Ferro Manganese Policy

Provides for Gingerly Shipment From England—Steel Corporation Helps Some of Its Competitors

New York, March 2.—Indications now point to a resumption late in March or early in April of shipments of ferro-manganese to this country from England. Representatives in this country have received cabled advices from the makers that the latter hope to complete arrangements this week whereby about 500 tons will be released to each direct agent, making about 2,500 tons in all, to come forward within 30 days. If this tonnage represents the full monthly quantity to be licensed, it will fall considerably short of meeting the regular needs of consumers in this country and will not greatly relieve the situation. In previous advices, a 5,000-tons-monthly allotment was specified as the amount the English authorities were disposed to allow to be shipped.

Leading representatives in this country of English makers now are making no further offers to sell at $68, seaboard, subject to the resumption of shipments as instructed by cable advices received a few days ago. The English producers have ordered that no further sales be made at the official price until the unsettled situation pertaining to the resumption of shipments against old contracts is cleared up. Under the recent circumstances, the $68, seaboard, price has been purely a nominal figure, inasmuch as sellers have at no time been able to guarantee when material bought at that figure would be shipped.

The spot market on ferro-manganese continues to hold somewhere around $90 to $100 a ton. A sale of 50 tons in the middle west at $85, seaboard, is reported. Some small lots which have been in warehouse at Baltimore for an eastern seller, have been sold, the aggregate amounting to several carloads and the prices obtained are reported to have ranged from $90 to $100, seaboard. A lot of 50 tons was offered in the Philadelphia market this week at $125, seaboard.

Offering American-Made Ferro

Another brand of American-made standard ferro-manganese now is being offered on the market by a Philadelphia merchant. This product is being manufactured from Brazilian ores by the electric furnace method, the merchant having made a conversion arrangement with a metallurgical manufacturer at Niagara Falls. None of this material is being offered for earlier delivery than May and such sales of carloads or larger lots as have been made have been at around $100, at the plant.

Four schooners have been chartered to bring to eastern seaboard a total of about 10,000 tons of Brazilian ore, which will go to domestic consumers under arrangements previously made. It is reported that these vessels were chartered at the rate of $6 per ton. Some Brazilian ore has been offered in the market the past week at high figures.

The liberal buying of spiegeleisen is going forward steadily. Domestic buyers took some good tonnages in the week and there have been further sales for export, bringing the total of the latter up to several thousand tons, which will go principally to Italy. Domestic makers have been advancing their prices and now are quoting $26 to $28, at the furnace, for 20 per cent material.

Ferro Still Uncertain

Pittsburgh, March 2.—The ferro-manganese situation is still uncertain. Indications are that sea forces of the belligerent nations may become more active, and shipping may be seriously threatened, if some of the plans under contemplation are carried out. Ferro-manganese dealers at this center are patiently watching developments. Reports of sales at about $100, seaboard, are heard, but some in close touch with the situation regard the market as quotable at as high as $125, seaboard, for immediate shipment. The Jones & Laughlin Steel Co. has discontinued the manufacture of ferro-manganese at its Aliquippa blast furnace plant, having enough material on hand to meet needs for some time to come.

Taking Care of Competitors

Cleveland, March 2.—The Carnegie Steel Co. is coming to the relief of plants in Cleveland and vicinity in selling ferro-manganese at $100. The policy of the Steel Corporation is being highly commended by independent companies.

(*For complete prices see page* 494.)

Italy's Scrap Offers

Are Advanced $3 Per Ton, But High Freight Rates Still Interfere With Business—Carnegie Steel Co. a Buyer

Philadelphia, March 2.—Italy, which, as previously reported, has bought ingot crop ends in this country, continues to show a more vigorous interest in American iron and steel scrap and is sharply advancing the prices it will pay. Buyers now state their willingness to pay 85s or about $20.75 c. i. f. Italian ports for No. 1 heavy melting steel, or for old steel rails. This figure is about $3 a ton above that last offered. The realization of business from these ordinarily very attractive offers remains wholly a question of freight rates, which to the Mediterranean still are on a high plane, but sellers are making renewed efforts to put through some business. New export inquiries for scrap call for 1,000 tons of heavy steel and 1,000 tons of car wheels for Italy. The local market displays considerable price firmness, but is quieter this week. Scrap is coming out in limited quantities, especially steel, owing to reduced production and to holders' expectations of better prices. Steel works are paying $10.50 delivered eastern Pennsylvania for heavy melting steel and brokers $10.25 delivered. For steel shafting, $14.50 delivered is offered and for wrought pipe $10.25 delivered. Heavy cast is less active.

Scrap Values Puzzling

Pittsburgh, March 2.—Opinions differ as to the effects of the buying of the Carnegie Steel Co., which took about 5,000 tons of heavy melting steel last week, at from about $12 to $12.50, delivered Munhall. Some dealers are holding this grade at $12.50, but others say they have been unable to obtain more than $12, delivered. The market has been quiet the last few days, and there has not been enough selling to determine the price position of most grades. Heavy melting steel is named at $12, or 25 cents a ton above the previously prevailing quotation.

Moving Slowly

New York, March 2.—The old material market in this territory is moving rather slowly at present. Buying by the larger consumers still is spasmodic and dealers, expecting better things, do not feel inclined to sell freely at ruling offers. New orders, as a consequence, are rather few and light. Brokers continue to make some vigorous efforts to buy and are bidding rather high, notably $8.25 to $8.50, New York, for heavy melting steel and $8, New York, for wrought pipe. There have been no further transactions in wrought pipe since the purchase of 2,000 tons by a New Jersey buyer noted a week ago. Cast scrap is in less demand. One eastern Pennsylvania consumer has been paying $14.50, delivered, for steel shafting. Some of the eastern Pennsylvania steel works which are producers of low phosphorus scrap are holding their material at high prices. Continued inquiry for iron and steel scrap for export, chiefly for Italy, is in this market. One New York broker is sounding the market for 5,000 to 10,000 tons of heavy melting steel for Italy.

Considerable Activity

Buffalo, March 2.—Consumers outside of the Buffalo district, coming into the market for turnings, borings, bundled sheet scrap, No. 1 and 2 busheling scrap, caused considerable activity to develop within the past week, resulting in prices of these commodities advancing from 25c to 50c per ton. Some sales of heavy melting steel to users in the Pittsburgh and valley section have been made, but caused no change in the quotation on this line. The leading local consumer is still out of the market.

Market Broadening

Cincinnati, March 2.—The iron and steel scrap market is gradually, but slowly broadening, but is being held back by the large surplus available from various sources in this territory. Steel scrap is still in much larger demand that cast scrap. Local foundries are fairly busy on machine tool castings, this being the principal product at the present time. Heavy melting scrap has been the best seller of the week at from $9 to $9.50 per gross ton.

Scrap is Weaker

Chicago, March 2.—Considerable weakness is developing in the scrap iron and steel market from the fact that an increased quantity of scrap is becoming available and larger consumers in this territory have covered their necessities for some time. In fact, one of the largest users has placed an embargo on several kinds of scrap, which is likely to last for several weeks. Prices have been advancing by gradual steps for several weeks and are now considerably higher than the low point of the winter, but apparently the advance has gone faster than the demand and a point has been reached where some recession is necessary to restore the balance.

The Baltimore & Ohio railroad has a list before the trade containing 9,350 tons, of which 2,000 tons are long steel rails, 1,000 tons car wheels and 600 tons each of No. 1 and No. 2 wrought. The Santa Fe is offering 2,355 tons and the Rock Island 1,350 tons.

Firm at St. Louis

St. Louis, March 1.—The tone of the scrap market is better, and while only a few items show advance in prices, the tendency seems to be to stand firm. Dealers believe the minimum price has been reached for the time being, at least.

Railroad lists out today are: Atchison, Topeka & Santa Fe, 2,300 tons, of which the principal item is 200 tons of No. 1 railroad wrought; Vandalia, 500 tons of No. 1 scrap steel rails; Terminal Railroad Association, 1,000 tons of 70 pounds and 80 pounds scrap rails, most of which will go for rerolling rails; New York Central, open list upon which the tonnage is not specified, to close March 2.

(*For complete prices see page* 494.)

Spring Helps Warehouses

Chicago, March 2.—Spring work out of doors is so near that warehousemen are feeling the effect of its approach and materials for building are beginning to move in much better volume. Labor disputes are well on their way toward peaceful settlement in this city and this is an added factor in clearing the situation and bringing a better demand for materials.

Galvanized sheets are still quoted at 3.75c, Chicago warehouse, for No. 28 gage, but it is thought probable a further increase may be made within a few days, in keeping with conditions.

Ore Moves More Freely

Cleveland, March 2.—Shipping instructions have resulted in a freer movement of ore from docks to furnaces and it is expected that a very fair tonnage will be moved this month. The representatives of Lake Superior iron ore agencies are keeping closely in touch with furnace operators, but there is no discussion as to prices and it is not expected that there will be any buying for several months.

The puddling mill of the A. M. Byers Co., Pittsburgh, at Girard, O., resumed operations March 1. The works contains 88 furnaces.

Plate Orders Placed

For Ships, Elevated Work and Other Purposes Make Good Tonnage—Evidence of Weakness in Prices in Some Centers

Philadelphia, March 2. — Ship yard elevated railroad and miscellaneous requirements are bringing into the market here some good tonnages of plates. Competition for these orders has been spirited and it is reported in some cases 1.259c, delivered, eastern Pennsylvania, or 1.10c, Pittsburgh, has been shaded. In some of these cases, notably ship building steel, however, the steel probably has been under protection by the mills for some time. L. F. Shoemaker & Co., Pottstown, Pa., who will receive about 7,000 to 7,500 tons of steel for an elevated railroad section in Brooklyn, are in the market for this plain material and for 2,000 to 3,000 tons additional for other work, the total including about 7,000 tons of plates alone. It is reported that Pittsburgh district mills have made an attractive price on this business and probably will get the full tonnage of plates and shapes, although a small part of the plates may go to an eastern mill. The Lukens Iron & Steel Co. will supply about 2,500 tons of plates for the tank ship for the Anglo-Saxon Petroleum Co., recently taken by Harlan & Hollingsworth and the shapes, 1,000 to 1,500 tons, will go to the Carnegie Steel Co. The latter company also will furnish the Cramp yard with 6,000 to 6,500 tons, chiefly plates, for three barges for the government recently taken. No further contracts for ship construction were placed with eastern yards the past week. A number of inquiries continue in the market, however. Eastern plate makers continue to maintain operations on a slightly better basis. The Ivy Rock mill is running and another maker is doing about 70 per cent. The nominal advance of $1 a ton to 1.309c, Philadelphia, or 1.15c, Pittsburgh, for March delivery became effective today. There are indications, however, that some makers still will do 1.10c, Pittsburgh, on a desirable order.

Plates for War Material

New York, March 2.—An order for about 10,000 tons of plates for the manufacture of war material has been placed with a western Pennsylvania maker. It is understood this steel is for shipment to England. Steel Corporation mills will furnish about 4,000 tons of plates for the interstate bridge at Portland, Ore., which has been awarded to the American Bridge Co. and the Northwestern Steel Co. A lot of 4,500 tons of plates for the third tracking of the Broadway elevated line in Brooklyn, which was bid upon the past week, is asked for by the successful fabricator. Eastern plate makers started yesterday to quote the general advance of $1 a ton or 1.319c, New York, and 1.15c, Pittsburgh. It has not yet been possible to determine whether such a price level will become staple.

Plates Now 1.15c

Pittsburgh, March 2.—Steel plates for March delivery are being held at 1.15c, or $1 a ton above the price previously prevailing, and that figure now represents the market for spot delivery. For second quarter shipment, makers are asking 1.20c, but new buying is confined almost entirely to the present. The Carnegie Steel Co. continues to operate its plate mills at about 90 per cent capacity, but, generally speaking, plate mill operations in the Greater Pittsburgh district do not exceed 65 per cent of capacity.

New Price Quoted

Cleveland, March 2.—Cleveland makers are adhering rigidly to the 1.15c quotation on plates for March delivery. Mills are operating at full capacity at the Lakeside plant of the Otis Steel Co. and at the plant of the Cleveland Steel Co. The outlook is regarded as favorable.

Plates Lack Strength

Chicago, March 2.—Demand for steel plates is not increasing to the same degree as shapes and bars, although an improvement is noted in this department as well as others. Mills turning out plates are not acquiring tonnage to the same degree, and as a result the only weak spot noted in the steel market is the possible shading of current quotations in the case of plates. However, this price is being done only by a few small independents who roll only a small assortment and do not cut a decided figure in the market. Quotations of 1.34c, Chicago, are being made generally, but plate business is small at best.

Thomas Iron Co. Changes

J. E. Thropp Jr. has been appointed superintendent of the Lock Ridge blast furnaces of the Thomas Iron Co. at Alburtis, Pa. Charles E. Hulick, who has been superintendent of these furnaces, will give all of his time to the Hokendauqua plant, where No. 1 furnace will be blown in at once.

Owing to the continued illness of James W. Weaver, secretary and treasurer of the company, Oliver T. Case has been appointed assistant secretary and Lawrence K. Diffenderfer has been appointed assistant treasurer, with authority to act during the absence of Mr. Weaver.

Idle Furnace

In Market for Coke—Connellsville Output Increased

Pittsburgh, March 2.—A central western merchant blast furnace, idle for several months, has sent out an inquiry for future quotations on about 10,000 tons a month, but it is not believed a contract for extended delivery will be signed, because of the relatively high price of contract coke. Contract furnace coke continues to be held at a range from $1.65 to $1.75, ovens, but the minimum figure can be shaded 10 and possibly 15 cents a ton for prompt delivery. The market for foundry coke shows no change in position. According to the *Connellsville Courier*, production in the upper and lower Connellsville regions the week ending Feb. 20 was 271,060 tons, an increase of 20,135 tons over the week before.

Wire Extras

On Galvanized Product Are Advanced $2 Per Ton

New York, March 2.—An advance of $2 a ton in the extra for galvanizing has been established in wire products by the makers, effective March 1. An additional extra has been imposed for painting, making the advance of the extra $3 a ton for painted and galvanized barb wire. On plain wire the galvanizing extra has been advanced from 40 to 50 cents per 100 pounds, making the price to jobbers at the present official base $1.90, Pittsburgh, for galvanized plain wire. On wire nails, 1-inch and larger, the new galvanizing extra is $1.20 per 100-pound keg, against $1.10 formerly, making the present price for galvanized nails to jobbers $2.80, Pittsburgh, per keg. On nails under 1-inch in length, the new extra is $1.70 per 100-pound keg, against $1.60 formerly, making the new price to jobbers for such a product, galvanized, $3.30, Pittsburgh, per keg. The extra for galvanizing in barb wire is 50 cents per 100 pounds with 5 cents additional for painting.

(*For complete prices see page* 494.)

More Favorable Outlook

In the Structural Market—Large Tonnage for Elevated Work—King Bridge Co. Takes Cleveland Job

New York, March 2.—Unfolding of more favorable conditions in the structural steel market in the metropolis and adjoining territory is continuing and producers are in better spirits. New inquiry now is coming out more freely and awards are increasing. It is the large amount of work, however, that still is in the estimating stage and not yet upon the market that represents the most promising feature of the situation. Apartment house construction in this city is becoming more active. The public service corporation of New Jersey has ordered the final completion of the terminal station at Newark, 9,500 tons, awarded several months ago, to the Hay Foundry & Iron Works. Some of the work was released recently. Now the entire project will proceed. Awards in this district the past week totaled about 15,000 tons, the largest of which was the 13,000 tons of elevated work in Brooklyn, placed by the contractors with the American Bridge Co., which was bid upon several weeks ago. In addition, the interstate bridge, at Portland, Ore., 9,000 tons, was placed. Bids also went in on 7,000 tons for third tracking the Broadway elevated line in Brooklyn, on which L. F. Shoemaker & Co. was the low bidder at $37.20, delivered. The Fort Pitt Bridge Works bid $37.40, delivered, and the Pennsylvania Steel Co., $37.60, delivered. The high bid was $44.20, delivered. An unfavorable development in the situation has been the decision by the court of appeals sustaining the state law forbidding the employment of foreign labor on public contracts. This has thrown into confusion the subway and elevated construction work now in progress in this city and has tied up further awards of this character. The situation may be quickly relieved, however, as the state legislature has before it an emergency measure to repeal the alien act and to restore the subway and elevated contracts now in jeopardy. While structural shape prices nominally were advanced to 1.319c, New York, or 1.15c, Pittsburgh, it still is believed that attractive tonnages may be placed at considerably less.

Inquiry Increases

Philadelphia, March 1.—Railroad inquiries for structural steel in this territory are better and the major part of the new business that has been coming out is from these buyers. In other branches of the structural trade, there is a slight spread of inquiry and future prospects continue to be made promising. The Pennsylvania railroad is sending out new bridge inquiries weekly and since it recently withdrew its large budget inquiry because of the unwillingness of the shops to bid in this form, it has put forth 2,000 to 3,000 tons of work. The indications are this road will continue to push forward its bridge requirements in order to secure the advantage of the low prices now prevalent. Other railroads, including the Chesapeake & Ohio and the Southern, which have been placing some tonnage recently, appear to be following somewhat similar policies. Eastern shape mill operations remain very unfavorable but generally these makers today are quoting the advance to 1.309c, Philadelphia, or 1.15c, Pittsburgh. Because of the keen need of tonnage of eastern mills, it is an open question whether the new price will be maintained on business for nearby delivery.

Structural Contracts Scarce

Pittsburgh, March 2. — Structural plates and shapes are being held at 1.15c for March and 1.20c for second quarter delivery. The 1.10c figure, so far as can be learned, disappeared Feb. 28. Demand for structural material last month was not heavy, although mills on special work enjoyed considerable activity. The Jones & Laughlin Steel Co. has taken the contract for the Logan-Gregg Hardware Co. building.

Viaduct Contract Awarded

Cleveland, March 2.—The King Bridge Co., Cleveland, has been awarded the contract for the 9,500 tons of steel for the Clark avenue viaduct and the plain material will be furnished by the Carnegie Steel Co. The steel has already been ordered and it is expected that work will be begun at the earliest possible moment. Bids were opened at the city hall at noon, March 2, and were as follows: King Bridge Co., Cleveland, $51.90; McClintic - Marshall Co., Pittsburgh, $54.60; American Bridge Co., $55.90; Stroebel Steel Construction Co., Chicago, $62.60. The Pennsylvania Steel Co. also submitted a bid, but it was rejected as being informal. It was reported that the bridge to be built across the Chagrin river, Cuyahoga county, would require a considerable tonnage of steel, but the plans show that only about 40 tons of sheet piling, 17 tons of reinforcing bars and 13 tons of shapes will be needed. A new tube plant which the Elyria Iron & Steel Co., Elyria, O., will erect in Cleveland will require about 215 tons of structural steel.

Shapes Move Slowly

Chicago, March 2.—Following other finished steel products prices on structural shapes have been advanced from 1.29c, Chicago mill, to 1.34c, Chicago mill, beginning with the present week. Demand is not large, although it is increasing as the season advances and a large tonnage is being figured on architects' boards, which probably will come out within the next few weeks. A total of 3,100 tons of structural is included in seven contracts let recently in the west, the largest item being 1,648 tons for the Lyon & Healy building at Jackson boulevard and Wabash avenue, Chicago, which is taken by the American Bridge Co.

CONTRACTS AWARDED.

Lyon & Healy building, Chicago, 1,648 tons, to American Bridge Co.

Western Maryland Ry. Co., grain elevator, Port Covington, Baltimore, Md., 232 tons, to McClintic-Marshall Co.

Byrne Brothers Dredging & Engineering Co., incline and tipple, Calumet Sag Channel, 107 tons, to Kenwood Bridge Co.

Trans-Mississippi Terminal Ry. Co., inbound freight shed and outbound freight shed, New Orleans, La., 305 tons to American Bridge Co.

R. J. Gunning, store and office building, Chicago, 421 tons, to Kenwood Bridge Co.

Post office building, Medford, Oregon, 103 tons, to Pacific Rolling Mill Co.

High School building, Peoria, Ill., 284 tons, to A. Bolter's Sons.

Clark avenue viaduct, Cleveland, 9,500 tons, to the King Bridge Co., Cleveland. Carnegie steel will be used.

Bridge for the Philadelphia railroad at Titusville, Pa., 430 tons, awarded McClintic-Marshall Co.

Bridge for Chesapeake & Ohio railroad at Thermond, W. Va., 700 tons, awarded McClintic-Marshall Co.

Connelly office building, Atlanta, Ga., 700 tons, awarded American Bridge Co. by contractors, Wells Bros.

Paterno apartment at Seventy-eighth street, New York City, 700 to 800 tons, awarded Passaic Structural Steel Co.

Two bridges for Erie railroad, 300 tons, awarded Lackawanna Bridge Co.

Addition to power house of Philadelphia Electric Co., Philadelphia, 400 tons, awarded Levering & Gerrigues.

Section No. 1 of Jamaica avenue elevated railway extension for New York Municipal Railways Co., 13,000 tons, formal award now made to American Bridge Co. by Post & McCord, general contractors.

Interstate bridge, Portland, Ore., 9,000 tons, including 7,700 tons awarded American Bridge Co. and 1,300 tons to Northwestern Steel Co

Experimentation station of the Bureau of Mines, Pittsburgh, 200 tons; bids being taken.

Bridge work for Pennsylvania railroad,

(For complete prices see page 494.)

about 1,250 tons, including 840 tons for a viaduct at Camden, N. J., 210 tons, at Mahaffey, Pa., and small bridges at California, Pa., and Clayton, Del.; bids taken.

Addition to Valentine Brewery, Newark, 200 tons, awarded to the Chas. Goeller Construction Co.

Parochial school for Cathedral Parish, Syracuse, N. Y., 250 tons, awarded to O. B. Haley.

Public School No. 93 Brooklyn, 400 tons, general contract awarded to Frank Felgenhauer.

Remington Arms Co., Ilion, N. Y., plant addition, 1,200 tons structural, to Lackawanna Bridge Co., Buffalo.

Logan-Gregg Hardware Co., Pittsburgh, 8-story office and warehouse, 1,600 tons, awarded Jones & Laughlin Steel Co.

CONTRACTS PENDING.

Third tracking of Broadway elevated line of New York Municipal Railways in Brooklyn, 7,000 tons; L. F. Shoemaker & Co. low bidder.

School house at Fifty-sixth and Kingsessing avenue, West Philadelphia, 400 tons; bids to be taken March 8.

Herzog apartment at Eighty-fourth street and Lexington avenue, New York City, 400 tons; bids being taken.

Tishman apartment, Seventy-ninth street and Lexington avenue, New York City, 400 tons; bids being taken.

Additional work in terminal zone of New York Central & Hudson River Railroad, 250 tons; bids being taken.

Hospital at Boston, 450 tons; bids being taken.

Bridge for Southern Railway, 600 tons, including structure at Lookout Creek, Tenn., 425 tons; bids being taken.

Broad street bridge for City of Philadelphia, 400 tons reinforcing bars; Arthur McMullen Co., Inc., New York City, low bidder on general contract.

Section No. 4 of the Broadway-Fourth avenue subway line, New York City, 4,860 tons, which was postponed for bids to Feb. 27, again indefinitely deferred.

Store building for Frank Bros. at 588 Fifth avenue, New York City, 400 tons; bids being taken.

Slattery loft building, West Twenty-fifth street, New York City about 1,000 tons; plans about to be issued.

Loft building for the B. & N. Realty Co., Twenty-seventh street and Broadway, New York City, 800 tons; bids pending.

Addition to plant of National Lead Co., Long Island City, N. Y., 200 tons; bids being taken.

Loft building, 16 stories, to occupy site of Hoffman House, Fifth avenue, New York City; general contract to be performed by the Thompson-Starrett Construction Co.; steel tonnage still indefinite.

Sylvian Temple, Pittsburgh, 500 tons.

Elyria Iron & Steel Co., Elyria, O., tube plant at Cleveland, 215 tons.

Iron and Steel Pipe

Pittsburgh, March 2.—Pipe mills are enjoying fairly good activity, conservative observers estimating general operations at from 50 to 65 per cent of capacity. Prevailing quotations seem to represent the market at this center. No large orders have been placed recently in the open market.

T. I. Crane, of Pilling & Crane, Philadelphia, who has been spending some weeks at Augusta, Ga., has returned.

Buys Canadian Rails

Illinois Central Places Order for 20,000 Tons With Algoma Steel Co.—Sales in February Lighter Than in January

New York, March 2.—Competition by the Algoma Steel Corporation, of Sault Ste. Marie, Ont., for rail tonnage in this country against the home makers has assumed more important proportions, with the placing with the Canadian maker of an order for 20,000 tons by the Illinois Central railroad. This is the largest order yet taken by the Ontario mill on this side of the border and it brings the aggregate of such sales to probably 40,000 to 50,000 tons, which have been entered at $2 to $3 a ton below the prices of domestic producers. The Algoma company, in addition, has taken 500 tons for the Toledo Terminal Railway Co. and 500 tons for the Northern Ohio Traction Co. As previously reported, it also has received 4,000 tons for the Hocking Valley, 5,500 tons for the United States section of the Pere Marquette, about 1,500 tons for one of the New York Central lines and probably other lots.

Other rail sales of the past week include 20,000 tons for the Northern Facific, of which 8,500 tons went to the Illinois Steel Co., 7,500 tons to the Lackawanna Steel Co., and 4,000 tons to the Colorado Fuel & Iron Co. The Great Northern placed 10,000 tons, of which more than half went to the Lackawanna Steel Co., 1,000 tons to the Bethlehem Steel Co., 500 tons to the Cambria Steel Co., and the rest to the Illinois Steel Co. The Lackawanna Steel Co. has 5,400 tons for the Chicago, St. Paul, Minneapolis & Omaha.

Total rail sales reported in February reached about 150,000 tons, against 200,000 tons in January.

In export, Russia, which has been inquiring for 10,000 to 15,000 tons of 19-pound rails, ties, etc., for a portable track, practically has closed with a maker in this country. The 12,500-ton rail order for the Australian State Railways which was inquired for here will go to British makers, as new tenders now asked limit the competition to the latter mills. Russia continues to figure on 6,000 kegs of standard spikes.

Car orders remain light. The Burlington has placed 1,200 box and 300 stock with the Haskell & Barker Car Co. and still figures on 200 gondolas. The Boston & Maine has placed six coaches with the Laconia Car Co. The Missouri, Kansas & Texas is out with a new inquiry for 1,000 composite gondolas and 500 all-steel gondolas. The Illinois Central wants 100 gondolas. Pending inquiries for cars total about 3,000.

Total car orders in February were about 4,000, compared with about 2,500 in January.

(*For complete prices see page* 494.)

Cast Pipe

Lettings in Eastern Territory Show Fair Increase

New York, March 2.—New tonnage in the eastern cast iron pipe market has picked up again after several weeks of reduced activity and is of good volume. Prices continue to go through a hardening process, but the advance of the market has remained modest. The United States Cast Iron Pipe & Foundry Co. has taken 600 tons of 4 to 16's for the Bridgeport Gas Light Co., Bridgeport, Conn., and 400 tons of 4 to 24's for Pittsfield, Mass.

The Warren Foundry & Machine Co. has received 400 tons of 6 to 20-inch pipe for Holyoke, Mass., at $21.65, delivered for all sizes. The Standard Cast Iron Pipe & Foundry Co. has taken 840 tons of 8 to 20's for Portland, Me., at $21.48 for the 8's and 12's and at $21.25, delivered, for the 20's. R. D. Wood & Co. has 840 tons of 4 to 8's for Wellesley, Mass. John Fox & Co. is the low bidder on 280 tons of 12's and specials for the borough of Queens, at $21.47, delivered, for the pipe. The borough of Queens also is in the market for 900 tons and the borough of Manhattan for 300 tons for bids March 8, which is a contractor's letting. Hartford, Conn., is closing this week on 1,745 tons of 6 to 20's; Trenton, N. J., on 245 tons of 4 to 12's, and Richmond, Va., on about 600 tons of 12 to 16's.

May Advance Cast Pipe

Chicago, March 2.—With cities continuing to fill their requirements for the present year for water main extensions, the cast iron pipe market is distinctly stronger and an advance in prices is expected within a short time. The American Cast Iron Pipe Co. has been awarded 115 tons at Faribault, Minn., and the United States Cast Iron Pipe & Foundry Co. is low bidder on 2,400 tons at Minneapolis, the award not having been made formally. Bids will be opened at Chillicothe, O., March 9 on 600 tons and at Burton, Kans., March 10 on 300 tons.

Pig Iron Output Shows Big Gain

Despite Shorter Month Production Increases in February—Daily Average Jumps 8,198 Tons—More Stacks Blowing In

PIG IRON production in February showed a decisive gain, the daily average output jumping 8,198 tons, compared with January. The number of stacks in blast increased from 165 to 179.

Total production last month was 1,666,592 tons, compared with 1,591,-024 tons in January, a gain of 75,568 tons. The daily average production in February was 59,521 tons, against 51,323 tons in January.

The increase both in production and in the number of active stacks was due almost entirely to the increased activities of the steel works or non-merchant furnaces. The production of non-merchant iron in February was 1,223,485 tons, compared with 1,093,-964 tons in January, a gain of 129,-521 tons. Average daily production of the non-merchant furnaces in February was 43,696 tons against 35,289 tons in January, a gain of 8,407 tons.

The merchant furnaces produced 427,988 tons in February against 478,-034 tons in January, a loss of 50,046 tons. The actual decrease in merchant activities was smaller as the comparison for February is with a month of 31 days. This is shown in the small decrease in average daily production of the merchant furnaces. In February these furnaces averaged 15,285 tons daily against 15,420 tons in January, a loss of 135 tons.

Eighteen stacks were blown in during February and four were blown out, a net gain of 14. Three merchant furnaces were relighted and two blown out, a net gain of one. Fifteen steel works furnaces resumed and two were put out of blast, a net gain of 13.

The output of ferro last month was 7,515 tons against 12,614 tons in January, a loss of 5,099 tons. Spiegel production in February was 7,604 tons and in January 6,412 tons, a gain last month of 1,192 tons.

The merchant furnaces blown in were: One Buffalo, Buffalo Union Furnace Co., Feb. 10; Bessie, Bessie Furnace Co., Feb. 2, and Jackson, Jackson Iron & Steel Co., Feb. 11. Those blown out were: Tuscaloosa, Central Iron & Coal Co., Feb. 21, for relining, and Anna, Struthers Furnace Co., Feb. 4.

Steel works furnaces blown in were: South Works No. 4, Illinois Steel Co., Feb. 4; Gary No. 9, Indiana Steel Co., Feb. 15; Maryland No. 3, Maryland Steel Co., Feb. 24; one Central and two Shoenberger, American Steel & Wire Co.; one Ohio, Feb. 2, two Edgar Thomson, Feb. 5 and 10 respectively, one Duquesne, Feb. 2, one Carrie, Feb. 19, and one Clairton, Feb. 17, Carnegie Steel Co.; Lorain No. 2, National Tube Co., Feb. 1; Youngstown "C", Youngstown Sheet & Tube Co., Feb. 13, and one Eliza, Jones & Laughlin Steel Co. Those blown out were: One Bessemer, Tennessee Coal, Iron & Railroad Co., and South Works No. 8, Illinois Steel Co., Feb. 9.

Hannah furnace of the Republic Iron & Steel Co., which had been banked, resumed Feb. 9. South Works No. 2, Illinois Steel Co., resumed Feb. 22, after having been banked. La Follette No. 1, La Follette Iron Co., was banked Feb. 14. Lynchburg, of the Oriskany Ore & Iron Corporation, resumed Feb. 4, after having been banked. Belfont furnace of the Belfont Iron Works Co., will be blown out about March 20. Maryland No. 1, of the Maryland Steel Co., operated on ferro-manganese last month. Warwick No. 2 furnace, of the Eastern Steel Co., produced 4,304 tons in the week ending Feb. 14, a record for output at that plant.

MONTHLY PRODUCTION.

	1915.	1914.	1913.
January	1,591,024	1,879,336	2,787,800
February	1,666,592	1,888,607	2,578,670
March	.....	2,341,551	2,762,823
April	.....	2,261,501	2,754,353
May	.....	2,097,019	2,816,825
June	.....	1,904,566	2,616,883
Total 1st half.	.....	12,372,580	16,317,354
July	.....	1,955,324	2,558,275
August	.....	1,996,483	2,537,018
September	.....	1,882,718	2,494,098
October	.....	1,767,227	2,539,924
November	.....	1,501,269	2,229,960
December	.....	1,495,325	1,976,138
Total 2d half.	.....	10,598,346	14,335,413
Grand total.	3,257,616	22,970,926	30,652,767

AVERAGE DAILY PRODUCTION.

	1915.	1914.	1913.	1912.
Jan.	51,323	60,624	89,929	66,220
Feb.	59,521	67,450	92,095	72,372
Mar.	.....	75,534	89,123	77,791
Apr.	.....	75,383	91,812	79,254
May	.....	67,646	90,865	80,753
June	.....	63,486	87,229	81,125
July	.....	63,075	82,525	77,502
Aug.	.....	64,403	81,839	80,650
Sep.	.....	62,757	83,137	81,482
Oct.	.....	57,007	81,933	86,569
Nov.	.....	50,042	74,322	87,985
Dec.	.....	48,236	63,746	89,590
Average	55,214	62,934	83,980	80,124

FEBRUARY PIG IRON.

States.	No. of stacks.	No. in blast last day of month. Feb.	Jan.	Total tonnage made. Merchant.	Non-Merchant.	Totals—Feb.	Jan.
Pennsylvania	157	78	70	97,720	638,872	736,592	677,435
Ohio	73	39	34	81,274	314,583	395,857	362,510
Alabama	45	14	16	97,625	28,672	126,297	143,416
Virginia	22	4	4	15,293	.....	15,293	13,121
New York	26	13	12	67,488	45,393	112,881	119,790
New Jersey	6	1	1	6,096	.....	6,096	6,564
Illinois	26	8	8	10,555	81,683	92,238	88,306
Colorado	6	2	2				
Indiana	10	7	6				
Maryland	4	2	1				
Wisconsin	6	2	2	13,629	108,208	121,837	114,285
Kentucky	7	1	1				
West Virginia	4	1	1				
Tennessee	18	4	4				
Washington	1	0	0	16,460	6,074	22,534	27,224
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1				
Michigan	3	2	2				
Missouri	1	0	0	21,848	.....	21,848	19,347
Spiegel—All states...						7,604	6,412
Ferro—All states....						7,515	12,614
Totals	421	179	165	427,988	1,223,485	1,666,592	1,591,024

Addition to Carnegie Plant

Pittsburgh, March 3.—A contract for the erection of a $200,000 addition to the plant of the Carnegie Steel Co., New Castle, Pa., has been awarded to the Pennsylvania Engineering Works of that city. The contract involves the construction of a 1,000-ton metal mixer, a building 65 x 110 feet, a 75-ton crane and fifteen 50-ton hot metal cars.

The body of Robert M. Oliver, superintendent of the Oliver Iron & Steel Co., Pittsburgh, was recovered from the Monongahela river Feb. 28, after a 46 days' search. The body was sighted not far from the spot where Mr. Oliver lost his life when a skiff he was rowing capsized.

Silica, Coke, Sawdust and Salt

The Career of Dr. Edward G. Acheson is Fully as Surprising as the Ingredients in One of His Most Famous Inventions—Carborundum

BY C F WILLIAMS

A WHITE lie and a pawnbroker's loan twice saved the day for Dr. Edward Goodrich Acheson, inventor of carborundum, artificial graphite, aquadag, oildag, etc. The lie, as Dr. Acheson himself describes it, got him a job when he was without funds, and money raised on his watch chain enabled him to go to Pittsburgh, where he sold a valuable patent at a time when his finances were extremely low. The Acheson lie—there appears to have been only one—was told at Menlo Park, the home of Thomas A. Edison. Young Acheson, with a new suit of clothes on his back and $100 in his pocket, had gone to New York from his home in western Pennsylvania, to enter the electrical field. He called on all the electrical establishments whose names and addresses he could find, but no one offered him a job. Finally, in desperation, he bought a ticket for Menlo Park. After the usual formalities, he was ushered from the reception room of the administration building, as it was then known, to a room covering the entire second floor. At one of several long pine tables sat three men, one of whom was introduced as Mr. Edison. He wore a calico shirt and was coatless. Placing one hand to his ear, to indicate slight deafness, Mr. Edison asked:

"What do you wish?"

"Work," came the quick reply.

"Go to the machine shop and see Krussi," Edison directed as he returned to the work absorbing his attention. Acheson was conducted to the machine shop where he found Mr. Krussi, a foreign-looking man, who asked Acheson what he wanted.

"Mr. Edison sent me to you for you to put me to work," Acheson responded.

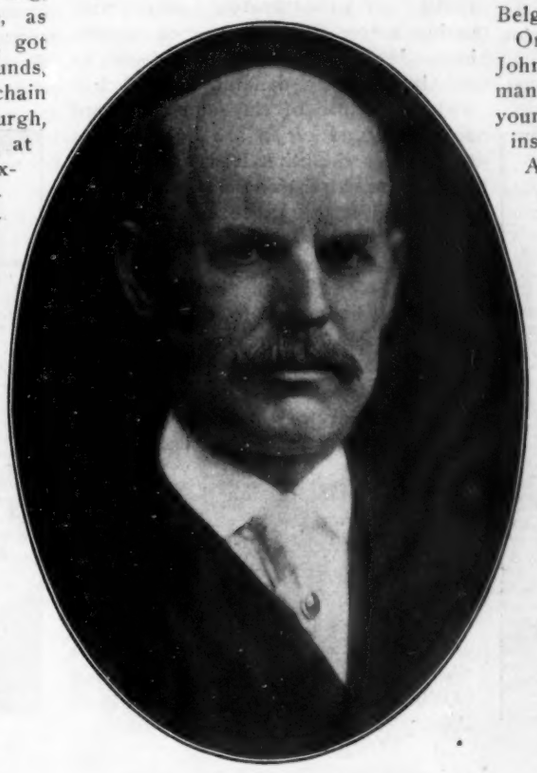
"What kind of work?"

"Drafting," replied Acheson.

"All right," Krussi said, and he assigned the applicant to the desired position.

"On the spur of the moment, I'm afraid I told a white lie," Dr. Acheson explains when referring to this incident. The Acheson lie is the kind that doesn't count, according to a recent definition offered by Andrew Carnegie.

After Acheson had been at Menlo Park a short time he showed Mr. Edison a small dynamo he had made several years previously. Questioned as to his opinion of the ideas involved, Edison said the dynamo was like one designed by Siemens. In Edison's library, Acheson that day found a description and an illustration of the Siemens dynamo, which was exactly like the one he had "invented".



A MODERN ALADDIN
Dr. Edward G. Acheson, American Scientist and Inventor

Acheson's enthusiasm was not affected, however. Upon learning that Mr. Edison was working on an electric meter to be used in connection with central station distribution, Acheson made a drawing outlining the design of the meter. He showed the drawing to Edison. After studying it a few moments, Edison declared:

"I do not pay you to make suggestions to me; how do you know but I already had that idea, and now if I use it you will think I took it from you."

Nine months after Acheson told the "white lie" he was sent to Europe as first assistant to the chief engineer of the Edison company, and introduced lighting systems in Holland, Belgium, Italy and France.

On his way to Europe, Acheson met John S. Huyler, the New York candy manufacturer, who later employed the young electrical genius to develop an insulated wire for electrical work. Acheson soon convinced Mr. Huyler his wire insulating project was worthless and induced him to lend his aid in the development of an anti-induction telephone wire. On a salary of $15 a week, Acheson worked for weeks in the damp sub-cellar of a New York power house, attempting to perfect the wire. The sub-cellar was an abominable place; when Acheson completed a day's work he was usually cold and almost numb from his feet to his waist. Discouraged, he went to Monticello, Pa., accompanied by his wife and family, to conduct some experiments for a brother on the reduction of iron from its ores by the use of natural gas.

The experiments were disappointing and unsuccessful. Failure to accomplish the desired purpose led Acheson to reconsider his anti-induction wire project, which he successfully developed shortly after he had moved his family to Kittanning, Pa., less than 50 miles from Pittsburgh. Acheson wanted to go to the city to sell his patent, but could not consider the trip because he had no money. He pawned a valuable watch chain and bought a monthly ticket.

The late George Westinghouse purchased the patent in the interest of the Standard Underground Cable Co., paying $7,000 in cash and $50,000 in stock of the company. He also engaged the inventor for a term of three years as an electrician, at about $2,000 a year. Before the railroad ticket expired, Mr. Acheson was out of debt. And he again was wearing his watch chain!

When his contract with the cable

company expired, Dr. Acheson formed a syndicate to resume his experiments on the conversion of heat energy into electricity, and, a short time later, the Monongahela Electric Light Co., Monongahela City, Pa., was formed, to help pay the cost of the experiments. Mr. Huyler and Joseph W. Marsh, then secretary, now president of the Standard Underground Cable Co., were interested in the Monongahela project. The new plant, however, failed to make expenses. Monongahela City, controlled by Republicans, was lighted by gas manufactured by members of that political party. Acheson, too, was of Republican persuasion. But he refused to support the flickering gas lamps and started an agitation. A few days before election he distributed hand-bills telling all about electricity and electric lights.

IN SCHOLASTIC ROBES

He also said a few things for and against the several candidates. The town went Democratic, and the streets were electric lighted.

Dr. Wilder D. Bancroft, speaking as president of the American Chemical Society, one time said of Dr. Acheson:

"To make carborundum, he needed electrodes, so he invented graphite. A suitable refractory was needed to keep the heat in the furnace and Mr. Acheson thereupon prepared siloxicon. The furnaces had to have brick walls at first, and they were promptly forthcoming in the form of Egyptianized clay. In order to keep everything running smoothly, including the three automobiles he had acquired in the meantime, Mr. Acheson prepared the lubricating graphite, aquadag and oildag".

Dr. Bancroft's remarks about Dr. Acheson would lead one to believe he possessed the original lamp of Aladdin. And, to a certain extent, such is the case, but the lamp has refused to operate all the time. For many years Dr. Acheson had to rub the lamp night and day in order to provide for himself and family. He is still rubbing it, but not of necessity.

The Birth of Carborundum

The story of the discovery of carborundum is as interesting as that of the white lie, or the pawnbroker's ticket.

Recognizing the value of a good abrasive, Dr. Acheson made experiments on impregnating clay with carbon under the influence of electric heat. He attached an iron bowl to one lead from a dynamo and filled it with a mixture of clay and powdered coke; the end of an arc light carbon attached to the other lead was inserted into the mixture. The clay was melted by electric heat. When cold, the mass was examined.

"It did not fulfill my expectations," Dr. Acheson says, "but by sheer chance I happened to notice a few bright specks on the end of the arc carbon that had been in the mixture. I placed one on the end of a lead pencil and drew it across a pane of glass. It cut the glass like a diamond."

Under the impression that the abrasive was composed of carbon and corundum, Dr. Acheson called it carborundum. The Carborundum Co. was incorporated for $150,000, Sept. 21, 1891. George Westinghouse was among the first to use the abrasive in the manufacture of lamps, ordering $7,000 worth of small grinding wheels shortly after the company was organized. Under Dr. Acheson's supervision, the company erected a plant at Niagara Falls, work on which began in 1895. After creating an entirely new industry, Dr. Acheson lost control of the company.

Later, he formed the Acheson Graphite Co., after having obtained patents on the manufacture of graphite and the manufacture of graphitic articles. He developed "Egyptianized Clay". He also brought about the reduction of aluminum and silicon and the production of siloxicon, lubricating graphite, aquadag and oildag.

Dr. Acheson has been affiliated with the iron and steel industry in more ways than one. He was born March 9, 1856, at Washington, Pa., and six years later moved to Monticello, Pa., where his father was interested in a blast furnace, where young Acheson was employed as a timekeeper. When 17 years old, he made his first practical acquaintance with electricity when he silver-plated several cheap yellow metal watches, using a number of his mother's silver forks as anodes. Before approaching Edison for a job, Acheson had been engaged as a civil engineer, a dry goods store clerk, a blast furnace store clerk, the promoter of a device for regulating the supply of water to steam boilers, a railroad station ticket clerk, an oil tank gager and an iron ore miner. He is a member of every important chemical society in this country and in Europe and has had so many honors bestowed upon him he has to count them by groups.

Dr. Acheson is now at his London home, opposite Regents Park, where recruits are being drilled daily for the devastating war in Europe. Large containers of his lubricants, it is reported, are being rushed past his home to the war zones, to make automobile, wagon and truck "going" as easy as possible. Reports that one of his sons, Howard Acheson, who is attending school in England, had been called to the front recently were denied by cable to one of Dr. Acheson's daughters, the wife of C. F. Mackey, assistant general manager, Franklin Steel Works, Franklin, Pa.

DR. ACHESON IS OFTEN SEEN IN COMPANY WITH HIS SON

The Pittsburgh Iron & Steel Foundries Co., Midland, Pa., has issued a series of cards devoted to the subject of higher efficiency. These cards are attractively printed and contain short, pithy mottoes which are interesting and valuable. The cards are provided with strings for hanging in convenient places about a desk.

How to Use the Sales Engineer

What to Do to Get the Best Results in Buying New Shop Equipment—How the Manufacturer Can Help You Increase Your Production—First of a Series of Articles

BY ALBERT A DOWD

IN A CERTAIN line of business there were two competing companies with plants in the same town; one of the concerns had been in business for a great many years, while the other was comparatively new. It so happened that they were both in the market at about the same time for half a dozen heavy-duty milling machines. The manager of the older company called in his foreman and talked the matter over, with the result that they decided to order duplicates of the old machines, which had given good service for several years. To be sure, they had read something about more up-to-date tools in the trade papers, but the manager thought the new types would not be suited to "the peculiar class of work" handled in his shop and as the foreman expressed it, "We can't afford to take chances."

The chief executive of the newer concern also called in his foreman, together with the superintendent and the man in charge of the milling machine division in the machine shop.

"Our old machines have given very good service," said the manager, in opening the conference, "but I believe we had better investigate all the latest models before we place our order. There have been a good many improvements in milling machines in the past two years."

"Yes, indeed," followed the superintendent, "and I think we would all like to find some way to cut the cost of machining the bracket arms for our M-32."

At this point the young man who had charge of the milling machine division laid an advertisement which he had clipped from a trade paper on the manager's desk. It described a milling machine with radically new features. "This machine might do what we want," he said, "and since it's built by Jones, who spent a lot of time last spring to help us out the hole with our G-47, I say let's give him first chance at the job."

"A good suggestion," agreed the manager, "I'll get Jones on the 'phone right away."

And, as a result, Jones' representative, accompanied by the sales engineer, Robinson, made a second trip to the plant of the Progressive Mfg. Co., where Robinson went over the whole problem with the shop executives and even convinced the machine hands that Jones' differential vertical miller was easier to operate than any other machine on the market. The new tools were eventually installed and cut the time required for milling bracket arms on the M-32 from 65 to 43 minutes. Jones got the order because he not only sold machine tools, but sold service as well. The Progressive Mfg. Co., too, was rewarded for its enterprise in always taking advantage of expert advice on highly technical problems and we are not surprised to learn that a few years later it was able to buy out its older rival.

This little incident illustrates the old and new methods of buying shop equipment and shows how the sales

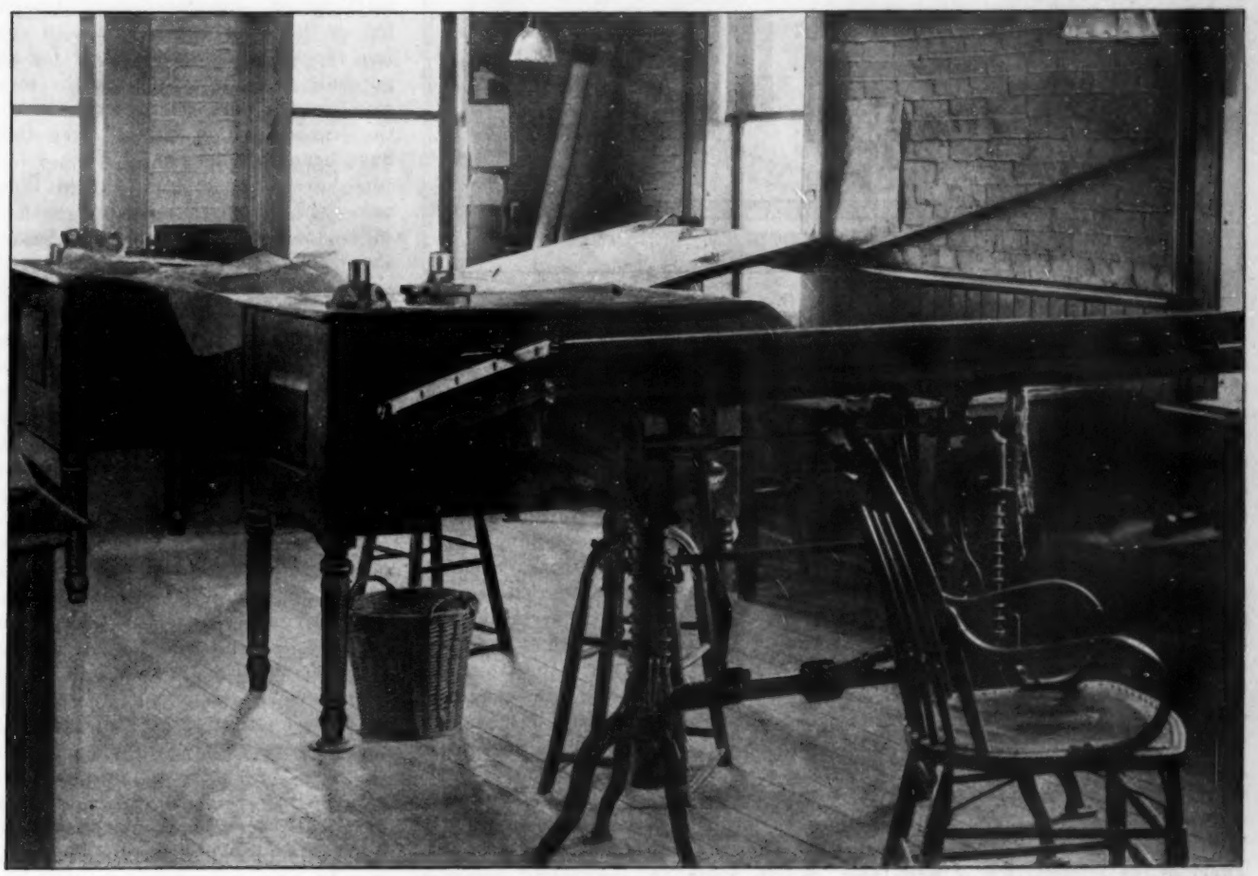


FIG. 1—A CORNER IN THE SALES ENGINEERING DEPARTMENT OF A PROMINENT MACHINE TOOL BUILDER

engineer has become an important factor in the service of both the buyer and the seller.

Although a considerable number of machinery manufacturers have developed their sales engineering departments to a high state of perfection, resulting in greatly increased business, a great many others are almost totally unfamiliar with this new force in business; also hundreds of buyers of shop equipment have seldom met a sales engineer in person and have little appreciation of the services he can render. His functions, however, are fraught with possibilities.

This series of articles will take up the work of the sales engineer in relation to the prospective customer, the salesman and the manufacturer of machine tools, bearing in mind also the effect on the operator in the employ of the customer. The first article will consider the customer's point of view in the purchase of machine tools, taking up such points as the type of machine most suited to the work in question, the output wanted, the adaptability of the tool, the power absorbed, the requirements in the way of operators, the outlay for special tools, the cost of upkeep of machine and equipment and other similarly important questions. The relation of the sales engineer to the customer, how his experience may be utilized to advantage both before and after the purchase of a machine, the effect of the introduction of new tools on the operator and the opposition sometimes encountered from this source and the relation of new methods to piece work prices also will be pointed out. The second article will take up the matter from the salesman's point of view, showing how he is assisted in his work by the experience of the sales engineer. It will also cover suggestions for handling work, time studies and estimates of production, estimated tool costs, the selection of suitable machine, standard equipment and its uses and competition with other salesmen showing how the experience of the sales engineer is a help in pointing out up-to-date methods of manufacture which appeal to the customer in a way that affects his pocketbook. Examples of savings effected will be given. Other points will be taken up showing how the sales engineer and the salesman work together to secure the best result, the salesman often being able to judge something of the requirements of the work, accuracy required, etc., from a visit to the plant and a general conversation with the prospective customer. The third article will deal with the manufacturer's relation to the sales engineer, showing the effect of the latter's work on the volume of business secured by the company. It will also be shown how the sales engineer's efforts form an advertisement with constantly increasing returns and how his work is of value in suggesting improvements in the design of the machines manufactured, both as to the details of construction and in minor items having to do with convenience in operating. His services also are useful in keeping up the efficiency of machines already sold by following up their work and making sure that the customer is obtaining maximum output. The sales engineer is able to give occasional suggestions in regard to production methods, thereby keeping the customer well satisfied with the results he is obtaining, so that he feels as if he is getting the worth of his money for the machine he has purchased. Also in production work in his own factory, the sales engineer is often called upon to plan out methods of handling work which tend to reduce manufacturing costs; or he is asked to estimate on the cost of handling outside work which may be taken in to keep the factory busy during a period of business depression. The complete series will cover the functions of the sales engineer very thoroughly and will take up the matter in sufficient detail to enable the reader to appreciate the value of work of this character.

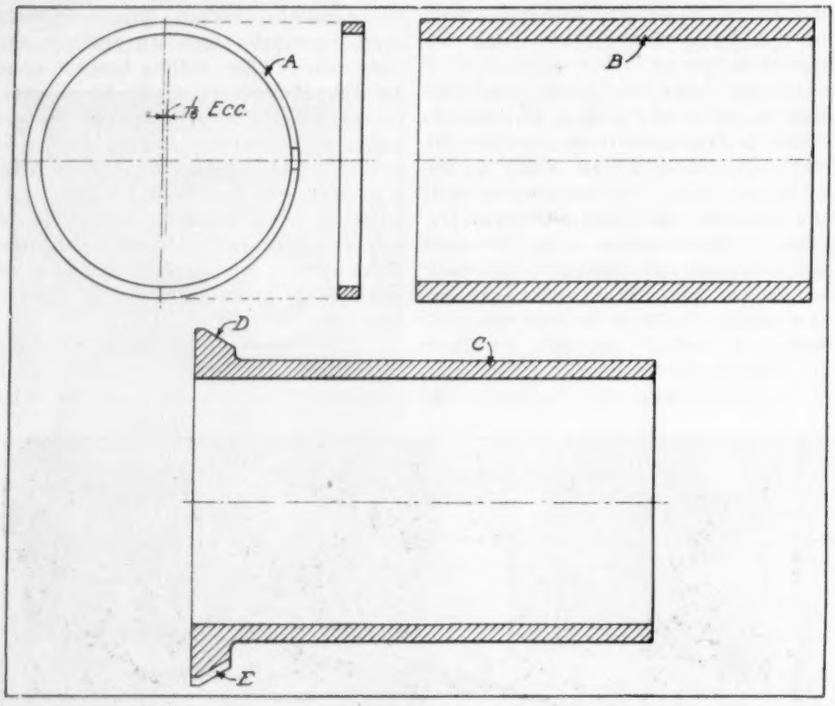


FIG. 2—A PACKING RING JOB ON WHICH A SALES ENGINEER INCREASED PRODUCTION FROM 30 TO 90 PIECES PER HOUR

How the Sales Engineer Serves the Buyer

To a manufacturer who is in the market for one or more new machines of a certain kind, there are several methods of procedure open, depending on his past experience with certain types, the money available for the purchase, and the attitude of the foremen or operators chiefly concerned in the use of the machines after they have been installed. All of these factors have a certain amount of influence on the purchase and make a difference in the method of selecting the machine. If the prospective customer has one or more machines in his factory of a type similar to those that he contemplates purchasing, and if these have been found to be a good investment from all points of view, it is quite likely that other machines of the same kind will be ordered direct from the builder, as in the case of the older concern mentioned in the introduction to this article. In a case of this kind there is little opportunity or call for the services of a sales engineer, for the order is placed direct without any chance of competition with rival companies. Neither is there a request for time studies or tool layouts, because the manufacturer thinks he knows exactly what he wants and the purposes for which machines are to used. He knows the tool equipment with which the other machines have been provided and having found it satisfactory, he simply duplicates it. In this way he feels sure that

the machines ordered will be satisfactory to all concerned, because the others have been in use four or five years and have given excellent results.

Now this is all very logical as far as it goes, but the customer who buys his machines after this fashion is not giving himself a fair show, for he does not realize the progress in machine tool design that has been made since he installed the other machines. Methods of machining certain classes of work are being improved constantly due to insistent demands for high speed production and it is not only possible, but probable, that an improved type of machine (perhaps made by the company that furnished the old one, or even by some other concern) might prove much more profitable. It is not the part of wisdom for any prospective purchaser to rely entirely on his own or his foremen's judgment when he is in the market for new machinery, for if he does so he will soon find himself outclassed by the more progressive manufacturer who keeps up with the times by purchasing machines which will give him the greatest and best production consistent with outlay and upkeep.

Keeping Up with the Times

It is here that the function of the sales engineer becomes useful, if the opportunity is given him to make suggestions regarding the choice of machines and methods of handling the work. If, then, the prospective customer selects several representative pieces of work and sends blueprints of them to various machine tool manufacturers who build machines of a type suited to the work in question, with the request that they recommend a machine and equipment for turning out the pieces, he will have taken the first step in securing expert advice on up-to-date manufacturing methods by specialists who make a constant study of production methods.

He will, in due time, receive calls from the various salesmen of the companies to whom he has written, each man having a proposal to make with suggested methods for handling the work, tool equipment, prices and other information carefully worked out by the engineers of the several companies. The customer then has the opportunity to compare the proposed methods with those in vogue and note the estimates of production together with prices and other matters pertaining to machine construction, etc.

It is quite possible that he may find the estimates of production submitted by the salesman about double the output of his existing machines, and he may express doubts as to the probability of the companies being able to live up to the figures given. If, however, the sales engineer has had sufficient information on which to base his estimate, and understands the manufacturing conditions which obtain in the factory in question, there is little doubt but that the estimate of production will be very close to the mark. If the number of pieces to be machined has been given in the request for the estimate, it should take into consideration the setting up time of the machine, time for grinding and re-setting tools, together with a sufficient time allowance to cover the placing the work on the machine and its removal after machining. The customer has the advantage of the suggestions made by the different sales engineers and can compare these at his leisure, selecting the machine and equipment which seems most suitable from the viewpoint of price, production, tool equipment, etc.

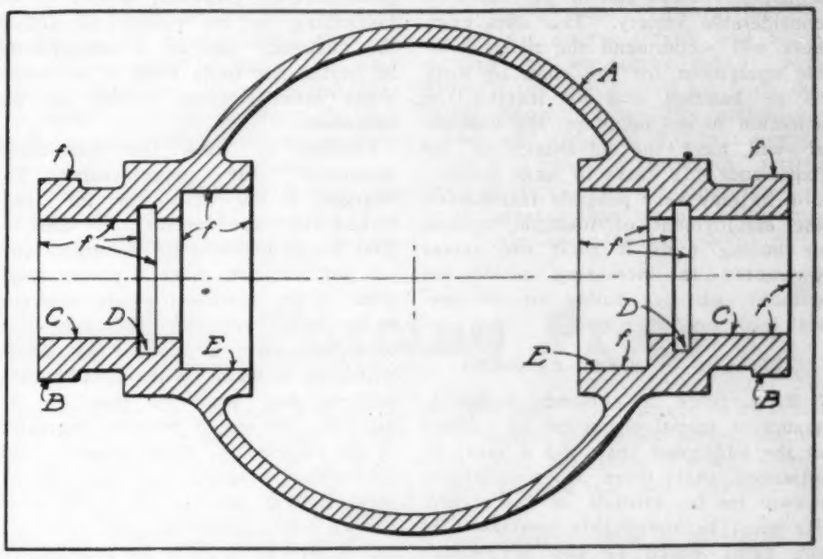


FIG. 3—REAR AXLE HOUSING FOR WHICH SPECIAL EQUIPMENT WAS DESIGNED

By means of the data submitted by the salesmen he can judge of the adaptability of the machines to various conditions and the flexibility of the tool equipment. The power of the machine must be considered and the question of individual motor drive taken up. This latter point is of importance from the standpoint of economy, but if the extra cost for motors and attachments seems too great an outlay, it should be noted with the idea of a possible later application. Individual motor drives are becoming more and more common and in a comparatively short time the point will be reached when line shafting in an up-to-date factory will be practically obsolete. Every customer should look forward in his selection of machine tools, and see that provision is made for a future application of motor drive should he feel disposed toward this method of applying power at a later date.

Another point in the selection of a machine tool is its requirements from the standpoint of the operator. The item of expense in this connection is an important one, but it is largely dependent on the class of work which is to be produced on the machine. If an automatic or semi-automatic machine is to be used, one operator can often take care of a number of machines, but if not of either of these types, the operator may be skilled or unskilled, depending considerably on the requirements regarding accuracy and the tool equipment proposed by the sales engineer.

In some instances salesmen use as a selling point the argument that an unskilled operator is all that is required, and the statement may be made that a green hand can be "broken in" to run the machine in a day or two. It is true that this is the age of specialization, and men are constantly being trained to run certain types of machines to the exclusion of others, but nevertheless the prospective customer should not figure too much on the employment of unskilled labor in turning out accurate work. On long runs, when a production of several thousand pieces is required, it is often possible to use cheap labor to advantage if proper supervision is provided, and special tool equipment used. In cases of this sort the value of the sales engineer again is seen in his relation to the customer, for the question of special tools is an important one and the expert designer may greatly increase output by their proper application.

The sales engineer must be made thoroughly conversant with the requirements of the work in order to decide regarding the advisability of special tool equipment. In turret lathe and vertical boring mill work there are many chances of increasing production both by the use of standard equipment and also by special tooling judiciously applied. Perhaps in no other field of manufacturing is the value of tooling more clearly apparent than on machines of these types.

The screw machine type which generally is applied to bar work in the manufacture of screws, studs and other work of similar character is usually provided with tool holders, adjustable turning tools with or without back rests, end forming or pointing tools, die heads, etc., and box tools with adjustable blocks can be purchased in considerable variety. The sales engineer will recommend the most suitable equipment for the class of work to be handled and by leaving the selection to his judgment the customer will have the advantage of his experience. In cases of large production he may very possibly recommend the employment of multiple turning or boring tools if their use seems warranted in increasing production without excessive outlay for the special tools needed.

The Cost of Special Equipment

Many times a customer looks askance at special equipment on account of the additional cost, and it must be admitted that there is considerable reason for his attitude in this regard. He must be thoroughly convinced of the gains which he can accomplish before he is willing to make the outlay. Many instances may be cited where special tools of somewhat elaborate construction have been sold to a customer for producing a certain piece of work, when neither the amount of production required nor the gain accomplished by their use was sufficient to warrant the expense incurred. These instances have led prospective customers to be cautious in the purchase of such equipment. If a man, however, can be shown that he is in reality saving a considerable sum of his year's production, even after taking into consideration the tool outlay, he should be well satisfied that results will warrant the expenditure.

In the past few years there has been a commendable effort on the part of machine tool manufacturers to provide equipment of a flexible nature, capable of adjustment to suit varying conditions, and the development of this equipment is of great value to a customer, providing that he takes advantage of the possibilities offered. The suggestions of a sales engineer in regard to methods of applying standard tools to a customer's want are of great value, especially when accompanied by time studies and tool layouts to show the arrangement and adaptation to conditions. As a general thing, machine tool manufacturers are not particularly anxious to build special tools, except as a matter of accommodation to a prospective customer who is anxious to secure as high a production as possible, and also to show the possibilities of the machine in competition with others. The profit to be derived from building special tools is usually very small, if there is any at all, and the cost of testing them out when completed often amounts to considerable, so that taken as a whole it is more or less unprofitable. The manufacturer, however, wishes to do everything in his power to satisfy the customer and as a consequence he builds the tools even if he sometimes actually loses money by the operation.

Looked at from the customer's standpoint the manufacturer has charged a big price for the tools (when they are special) and $500 or $600 worth of tools for a turret lathe job for instance, make a pretty small pile. If the customer would consider, in looking over the tools, the fact that there are a number of things which go to make up the cost in addition to just what he sees on the machine, he would become cognizant of the reasons for their apparent high cost. For example, the cost of design, pattern work, high-speed steel, testing and adjusting, and the fact that each tool is made by a toolmaker or other skilled mechanic, all have an influence on the cost and collectively amount to a considerable sum. To offset this apparently high price, the customer is assured of a set of tools made up in the very best manner and designed in such a way as to produce exactly the results he is looking for.

Playing Fair with the Customer

It is not usually the policy of machine tool manufacturers to make use of the brains and experience of the sales engineer in assisting to sell a type of machine unsuited to a customer's needs, for such a procedure will eventually react against the builder and injure his standing in the mechanical field. When a request comes in to a manufacturer for a machine and tool equipment necessary to produce a certain piece of work, the blueprint together with any other information pertinent to the subject are turned over to the sales engineer for his recommendations in regard to the matter. If in his opinion the work is of such a nature that it cannot be handled to advantage on the type of machine which his company is prepared to furnish, he returns the correspondence to the sales department with the notation "nothing to offer". As a result, the sales department informs the prospective customer that the work in question is out of the field of their machines and therefore they do not care to submit an estimate.

Adapting a Machine

It occasionally happens, however, that a prospective customer has other work besides the piece mentioned, to which a machine of the type manufactured by the company would be admirably adapted. Now in a case of this kind, when the sales engineer is cognizant of the fact, it may be possible to adapt the machine to the work in hand, either by means of special tooling, or by slight changes in some of the functions of the machine. As a general thing, machine tool builders do not advocate a procedure of this sort unless the machine can be considered as a profitable investment for the prospective customer, and he can be conclusively shown that such is the case. Unscrupulous manufacturers have occasionally taken advantage of a situation of this sort, by recommending a machine entirely unsuited to a customer's needs, with elaborate tool equipment and certain changes in machine construction, to adapt it to the conditions, but which on the general run of work manufactured by the customer would be an unprofitable investment. Cases of this kind are somewhat rare, for the majority of machine tool manufacturers do not wish to sell a machine unless its work is likely to be so satisfactory that it will result in future orders, and be a good advertisement.

When a customer's output is highly specialized and his production large enough to warrant the expenditure, the use of a special machine or group of machines may seem desirable, as, for instance, when a customer is producing the same thing year in and year out and wishes to get the highest production possible. The sales engineer may, in a case of this kind, recommend the building of the machines and may even in certain cases go so far as to estimate their cost. It is seldom that he is called upon to go as far as this unless he is employed by a firm making a specialty of building such machines. As a usual thing, special attachments or changes in construction of a standard machine will cover the case. There is an added advantage to the customer in making use of a standard machine, slightly changed if necessary to suit the spe-

cial requirements of the case, and with special attachments, because in the event of a change in product, the machine can easily be changed over so that it is practically a standard machine and can then be used as such for the new work. If it can be pointed out to the customer how readily he can change the machine over if it should in the future become necessary, an additional selling point is secured which is of value. When the sales engineer can show the customer that his future work as well as that which he now has in process can be handled by the same machine, he is giving the most efficient service both to the firm by whom he is employed and to the prospective customer, who should therefore feel assured that he is getting the worth of his money in every way.

The Sales Engineer and the Operator

As the operator of any given type of machine is a prominent factor in its success in producing the work required, his co-operation is a valuable asset which should be given due consideration. A prejudice may have been formed against a certain type of machine on account of inconvenient features of operation, tool equipment, lubricating devices or other points in construction which may not in themselves be of importance, but which are greatly exaggerated by the operator's viewpoint. The introduction of a new type of machine into a factory always forms a subject for discussion among the operators and the one to whom it may be assigned, immediately starts to "pick it to pieces", very often before he has attempted to do any work on it at all.

If the machine has been bought and equipped with tools for a certain job which has been machined in the past on an older type of machine, in all probability the time estimate of production set by the sales engineer, will be half or even less the amount of time that the operator has been in the habit of taking to produce the work. He sees in a moment that the piece work prices will drop accordingly and he thinks he will have to work harder on the new machine than on the old in order to make the same amount of money. Naturally this does not strike him as satisfactorily and he looks with disfavor on the arrangement.

In order, therefore, to reverse his attitude, he must be convinced that the new methods proposed are superior to the old as the new machine also is an improvement on that which he has been in the habit of using. Here the demonstrator who is usually sent to test out the equipment, is often able to convince the operator of the value of a number of points in construction which tend to make the machine more convenient to handle and increase its production possibilities. He can also point out the utility of the tool equipment and perhaps cite cases which have come under his own observation, where production has been greatly increased by similar means without undue effort on the part of the operator and with no decrease in the amount of pay received.

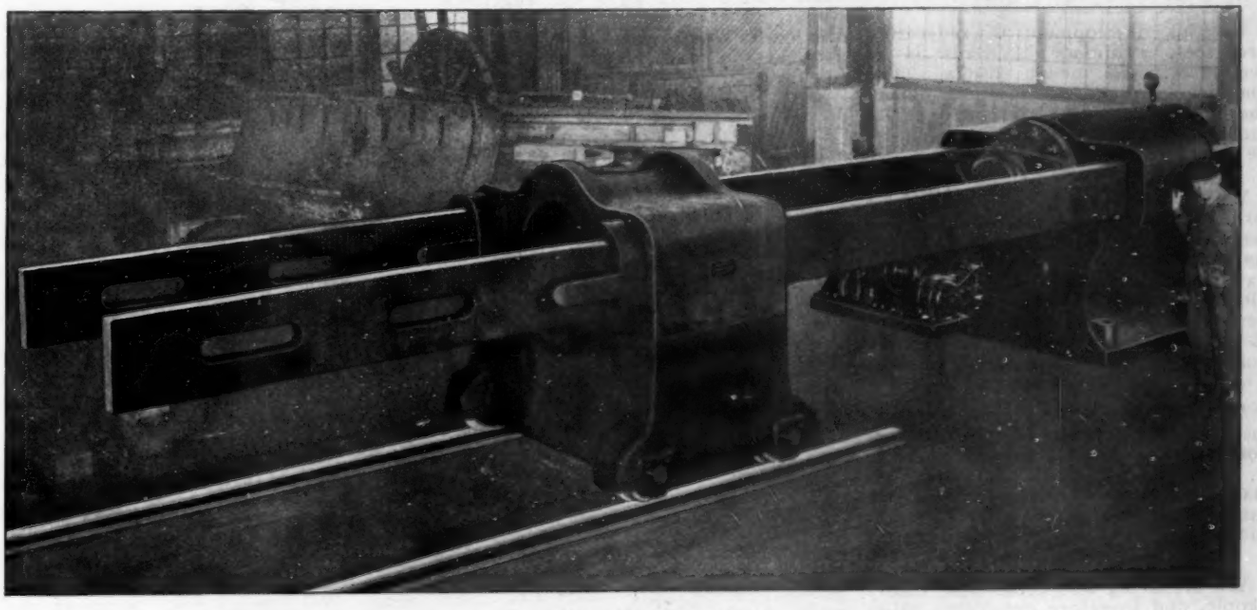
An operator can often be "won over" to a more favorable view of the matter by judicious handling and made into an enthusiastic supporter. Machines of heavy construction, designed for severe service and heavy cutting, are sometimes called "man-killers" and are looked on with disfavor simply because they appear unwieldy and awkward, but as a general thing it is simply a matter of "getting used to them", and the labor involved is no greater than on a smaller ma-

(*Continued on page* 494b.)

Large Hydraulic Forcing Press

ONE of the largest hydraulic forcing presses which ever has been built in the United States, has been completed recently by the Treadwell Engineering Co., Easton, Pa. It was especially designed by them for service in the Cuban-American Sugar Co.'s machine shops at Delicias, Chapparra, Cuba. The press is shown in the accompanying illustration, and is to be used for forcing sugar mill rolls off and on their shafts. The press has a normal rating of 1,000 tons, but is provided with a gage for recording pressures up to 2,000 tons. The plunger is 26 inches in diameter, packed by outside leather cuffs, and has three forcing speeds, 2/10-inch, 4/10-inch and 6/10-inch per minute.

The pumping outfit is a triplex oil pump with independent plunger con-



HYDRAULIC FORCING PRESS

trol, and is driven by a five horsepower motor. The valves for the pump are located in a separate block from the plunger, and are connected to the plunger chambers by seamless copper tubes. With the valves in a separate block, the three plungers can be controlled by a single lever, which is arranged so that either one, two or three plungers can be operated to give the desired forcing speed to the press. The gage is provided with a separate check for preventing damage to the recording hands when returning to zero after the pressure in the plunger cylinder is relieved. The pressure lines are made of seamless copper tubes and are provided with a pressure safety valve and a bypass valve for returning the oil from the press cylinder to the oil storage tank which is contained in the base. The tension bars are 5 x 15-inch section, 30 feet long, and were rolled especially for this press.

International Congress of Engineers

The technical success of the International Engineering Congress, to be held in San Francisco, Sept. 20-25, it is believed, is now well assured. Notwithstanding the difficulties arising as a result of the present European war, the committee on papers is able to count on from 200 to 250 papers and reports, covering all phases of engineering work, and contributed by authors representing some 18 different countries. The congress will, therefore, be truly international in scope and character, although the representation from the countries involved in the war will naturally be less than originally planned. It is said that the papers now are rapidly coming in and their character gives the assurance that the proceedings will form a most important collection of engineering data and a broad and detailed review of the progress of engineering art during the past decade.

The committee of management is now issuing to all important engineering societies, in this country and abroad, invitations to appoint official delegates to attend the sessions of the congress, and the presence of a considerable body of such delegates is well assured.

In general, the best oil to use on bearings is the lightest oil with which they can be safely run.

Sparks From the Grinding Wheel

By H. O. Tair

Prosperity has sure hit Jackson, Mich. A three to five-bench pattern works has gone and doubled its force—now there are six men instead of three. When Jackson has recovered some 75 per cent of its foundry business, lost through strikes a few years ago, it will have every other city of like size denuded of its cuticle by a mile.

* * *

Marcosson told us recently that the promissory note, applied to iron and steel, would loosen an immense amount of capital. Will some obliging gentleman kindly hand P. Note the chain tongs and set him to pulling?

* * *

For his development of redressing processes, Professor Richards is to receive a gold medal. Bully! The man who can redress anything during these piping times, from wrongs to metals, deserves all the recognition he can get.

* * *

Walter Alexander, a real district master mechanic of a regular railroad, has been appointed a member of the Wisconsin railroad commission. It's a way they have in that state of efficiency. Ordinarily, we expect a lawyer, who has never "railroaded" much to speak of, to land such appointments. Is this poaching on the legal man's preserves?

* * *

And so Atlantic City gets the next machine tool builders' semi-annual convention. This board-walk town, it must be admitted, has many attractions conventionwise, but, just the same, allow me to heave one tumultuous sigh for Cleveland; won't you?

* * *

We are a big and broad and kindly people, and therefore our Washington solons wisely sustained the veto of the immigration restriction bill. As the world's melting pot, we must perforce accept the alien laborer as a necessary ingredient, try to neutralize our racial and religious prejudices, and—well, we were all "foreigners" once, weren't we?

* * *

From the *Holdfast* (Mo.) *Banner:* "Our esteemed fellow citizen, Hex Nutt, over to the Holdfast Tool Works, who sustained a severe wrench last week, took a bad turn on Tuesday along about sunup."

* * *

Haven't as yet heard an iron trade man emit a scoff ag'in the eugenists. Don't do it. They are rooting for the brand "Made in U. S. A." This is what you may call making an early start.

* * *

Vulcan, the tutelary deity of the machine tool builders, is once more busy at his smithy. He has formed a partnership with Mars, god of war, and is working the tool shops overtime. It's an ill war that blows business to nobody.

* * *

"Have a heart, and put it into your letters," says a correspondence manager; it's the message in a letter that brings the response and gets the order. It may be hard to make this "silent salesman" talk right out—and most of us won't write as we talk—but, if we try, we can talk a warm red even if we do put it in typewriter violet.

* * *

Andrew Carnegie told the industrial relations committee that he had spent $374,657,399 for uplift—which was "damn white of Andy". He still insists it's disgraceful to die rich. Any other iron master of like belief who can show that he has even approximately uplifted to this extent is entitled to a spark from this wheel. The line forms on the right—and don't crowd.

* * *

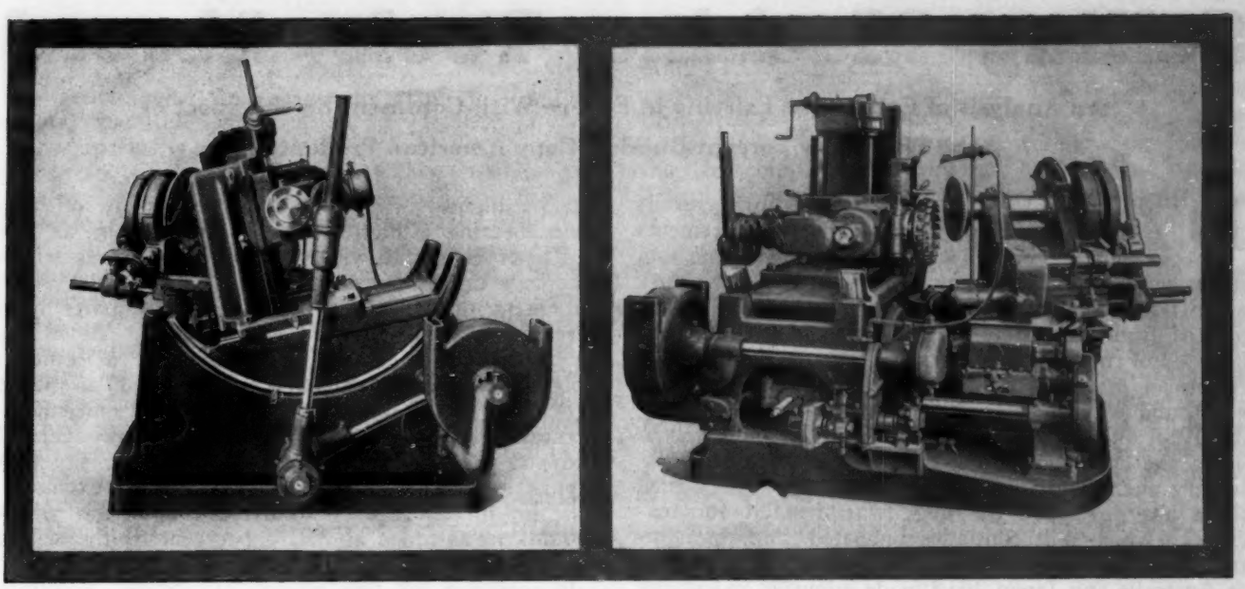
That "swords into plowshares" thing, it seems to me, has turned over altogether too much literary soil. Give some credit to the old flintlock musket, which was the first developer of the interchangeable system of manufacturer. In 1798 Jefferson declared that Eli Whitney had invented molds and machines for "making all the gunlock pieces so exactly equal that 100 could be taken apart and re-assembled by taking the pieces which come to hand."

* * *

We need no federal commission to inquire into the causes of industrial unrest. The causes of unrest, which is the mainspring of industry, are energy, hope, initiative and ambition. After first putting their own houses in order and separating unrest from admitted wrongs, these investigators can then go to it. And as old Blink Boffum used to say, "Give us somethin' besides a glowin' paregoric of words."

* * *

"Mirth is God's medicine, and everybody ought to be bathing in it," said Dr. Oliver Wendell Holmes. While we have always sought to make "human" the seriousness of *The Iron Trade Review,* these "sparks" are intended to add a light and pleasurable spot to a serious paper. Every day, something happens in our business surroundings that, if it were shared by the rest of us, would, without sting or hurt, help to lighten our business burdens. Will you "tabloid" whatever occurs to you and let us know about it?



Figs. 1 and 2—Arrangement of Spiral Type Bevel Gear Generator

Machine for Cutting Bevel Gears

Description of New Spiral Type Bevel Gear Generator Developed by the Gleason Works

A MACHINE for cutting bevel gears and pinions with spiral teeth has been developed recently by the Gleason Works, Rochester, N. Y. It is adapted especially for the automobile trade. Among the advantages claimed for gears of this type are that they are quiet and show a wide range of pinion adjustment without destroying the bearing. This machine works on the generating principle and is fully automatic. The cutter carriage is mounted on a vertical column which is supported on the cradle, as shown in Fig. 1. This cradle has circular ways with generous bearing surfaces and forced lubrication, permitting the maintenance of true alignment. A reversing mechanism drives the roll of the cradle and the work, a geared connection being used to transmit this reversing drive to each member. The final pair in each gear train is a worm and worm wheel segment. The correct relative roll of the cradle and work is secured by compound change gears. The correctness of this roll can be checked at all times by graduations on the machine.

All adjustments, it is said, are easily made. The vertical and horizontal adjustments of the cutter are controlled by accurate screws and the settings are made by means of scales for even tenths and graduated dials for thousandths. The cutter also can be adjusted lengthwise of its spindle to allow for the shortening of the cutter blades in grinding. The setting of the work head is read by means of a scale and vernier.

There are 20 blades in the cutter, 10 cutting outside and 10 inside. One side of a tooth is cut at a time, the setting of cutter and gear being changed after going once around in order to finish the other side of the teeth. The large number of blades in action permits the rapid finishing of a tooth. It is claimed that the average time per tooth for finish cutting is no greater than for a straight tooth gear.

The cutter, shown in Fig. 3, fits the spindle with a slow taper

(*Continued on page 475.*)

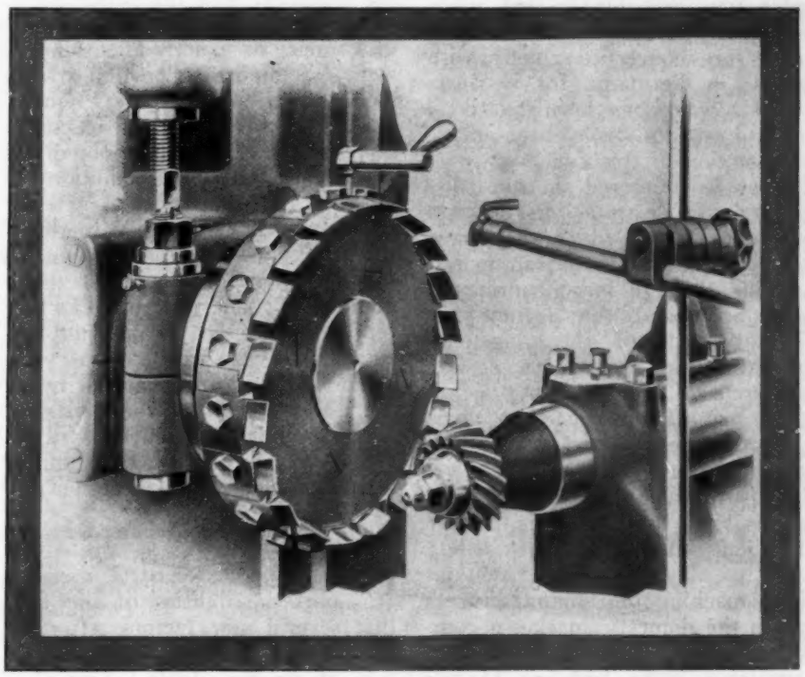


FIG. 3—CLOSE VIEW OF CUTTER

Selling Machine Tools Abroad

An Analysis of Conditions Existing in Europe With Comment on the Effect of the War—How Foreign Builders Copy American Products

DESPITE the great activity which now prevails as a result of the large machinery requirements originating in the war, American machine tool manufacturers are indulging in considerable conjecture as to how the present upheaval in the world's channels of trade ultimately will affect their foreign markets. For many years past the export demand for American machine tools has been increasing consistently, and exports in the two fiscal years ending June 30, 1913, and June 30, 1914, broke all previous years. Then the war came along and capsized all the customary methods of doing business abroad. Since then there has developed the huge war demand for machinery which still continues unabated, and, in addition, some of the neutral countries of Europe, as well as Australia and Japan, have made inquiries and placed some fair orders for machinery which under normal conditions undoubtedly would have been purchased in Europe. The present export demand, therefore, is looked upon as being the result of a great accident, and how long it will last cannot be foretold; next to booking as much of this business as they can, American machine tool manufacturers are most keenly interested in preparing for the future.

Not a Question of Cost

STRANGE to say, the main difficulty which American manufacturers have encountered in years past in the sale of their machine tools abroad has not originated in manufacturing costs, as many have believed. The experience of leading American manufacturers shows that, due to the superiority of American methods of production, a standard American machine tool in most cases has a lower production cost than a German or other European equal, and this despite the disparity in labor costs here and in Europe. The explanation probably is that while our efforts are directed chiefly to making labor saving improvements, Europeans are concerned chiefly with conserving raw materials; in Germany, for instance, where the price of coal always has been relatively very high, great forward strides have been made in economizing the consumption of this fuel.

The principal difficulty encountered in the disposal of American machines in Europe has been in the commercial arrangements under which they have been sold. In practically all cases, American manufacturers have been selling through large continental houses to which were accredited the agencies in various countries. The practice of these agencies has been to buy the American tools at a certain agreed price and then resell in Europe at a price in the fixing of which the manufacturer had no voice whatever. In other words, the American manufacturer has desired to have his cash in New York, being content to let his European dealers take their own course after paying for the machines, rather than bother himself about the details of selling methods in Europe.

As a rule, American machine tool manufacturers pay their selling agents in the domestic market a commission which averages about 12½ per cent. In some cases, this commission is as high as 15 per cent or higher, while in others, especially on machines bearing a high reputation, it may be as low as 10 per cent. In view of the commissions which American manufacturers have paid on export sales, the extent to which our machine tool exports have increased in volume indeed is surprising. As a rule the foreign sales agencies have secured a commission which generally has been regarded as about 25 per cent of the ultimate selling price. Some manufacturers, however, who have made a more careful study of the foreign situation than others, say that often, through a minute knowledge of exchange, etc., the foreign agents secure a commission which amounts to as much as 33 1/3 per cent of the selling price.

In contrast to this policy of selling American machine tools in Europe, is that of the German manufacturers. Most of the German manufacturers have exercised a much greater degree of control over the activities of their accredited agents, in many cases having gone so far as to take a business interest in the houses that sold for them. This has been especially true of sales made direct into Germany, but also true of sales of German tools to other countries, notably Russia. In numerous cases, for instance, German machine tool manufacturers who in the past sold into Russia through dealers, have helped to pay their rent and other expenses, and have shipped them machines on consignment and rendered them other assistance, in return for which they obliged the dealers to sell at a very low margin of profit.

Only in two cases, so far, have American machine tool manufacturers assumed direct charge of the sales of their own machines in Europe. These two manufacturers, one making an automatic chucking machine, and the other an automatic screw machine, only a few years ago opened their own offices in France, in exactly the same fashion as if France were an important portion of the domestic machine tool market. The success which has been achieved by these two companies has been of such an order that their example undoubtedly will be followed by other concerns after conditions in Europe again begin to approach normal. With the exception of these two concerns, no American machine tool manufacturers have had their own men in charge of the sale of their machines on the continent. A large number of American manufacturers have had direct representatives in Europe, but the functions of these representatives were almost entirely supplemental to the efforts of the authorized dealers who handled the sales of their companies abroad. These men have provided salesmen with "selling talks", have supervised installations and taught buyers how to get the most efficient service out of their machines, etc.

Where Will the Germans Stand?

OF CONSIDERABLE interest in analyzing the export possibilities of the future is the likelihood that several new factors, after the termination of the war, will exert an influence on competition in the sale of machine tools. Our chief competitor in the

sale of machine tools in Europe heretofore has been Germany. Whether or not the war will alter this condition is a subject of conjecture, but this eventually seems more than likely in view of the probability that the countries she is fighting will be averse for many years to come, to showing any preference for German goods. That this possible development is of no little importance to American machine tool manufacturers who desire to extend their export trade, is reflected in the great growth in the demand for machine tools for industrial purposes in recent years in the countries which Germany is fighting. This is true of France and Belgium, but is particularly noteworthy in the case of Russia, a country which, considering her large and growing purchases of late years, as well as the magnitude of her resources, which constantly are being developed on a more extensive scale, has come to be looked upon as the most important machine tool market in Europe. The use of machine tools also has increased greatly in recent years in Holland, Switzerland and Italy, in all of which countries Germany has been our principal competitor, and, in addition, the demand has grown tremendously in Germany itself. In Great Britain, where we have not had so much German competition, the use of machine tools also has been increasing constantly. With but few exceptions, therefore, it appears scarcely likely that German products in the future will be shown any preference in the European countries where heretofore Germany has competed most actively in the sale of machine tools.

It appears more likely that in the future England will be a strong competitor throughout all of Europe, excluding Germany and Austria. In England, where the machine tool industry practically originated, and later languished while it forged ahead in this country, there has been increasing activity in recent years. For several years past English tools have been sold on an increasing scale in the northern countries of Europe and there is every reason to believe that with the impetus which the industry is receiving in England as a result of the war, that country, in the future, can be expected to seek a growing outlet on the continent for her machine tool output. As an illustration of England's activity in this direction in recent years, may be mentioned a lathe which has been developed by a certain English manufacturer. In this lathe the speed change is through a belt and an adjustable cone which is actuated by a hand wheel, thus eliminating gear changes; this machine has been finding a very good sale in France and Holland.

The Effect of High Prices

CONDITIONS which affect the normal export demand for American machine tools have undergone important changes within the past 10 years, due to developments partly at home, but mainly abroad. During that period the metal-working industries of the various European countries, and particularly Germany, have expanded on a large scale, thus leading to a greatly increased demand for machine tools. During that period also prices on standard American machine tools generally have been advanced from 30 to 40 per cent on the average; it is true, of course, that the tools of which prices have been advanced have been rendered of increased value by reason of improvements leading to greater serviceability and production.

These two factors have been responsible in large part for a great development in the machine tool manufacturing industries of Germany, England and other European countries. They also have been responsible for a dropping off in our exports of drill presses, plain grinders, cone-driven lathes, horizontal boring mills, shapers, planers, etc., to Europe, due to competition furnished by foreign makers. This loss, however, has been more than compensated for by increases in the more highly developed products of the machine tool maker's art. In particular have our exports increased during the past few years in cam and crankshaft, internal and other specialized grinding machines, in automatic screw machines, automatic turret lathes, hand turret lathes, hand screw machines, universal, horizontal and vertical milling machines, high class radial drills, vertical boring mills, gear planers, high duty lathes, etc. In brief, the growth in export demand mainly has been in specialized machines, or in machines in which we were in the lead in some feature.

Among other things, American-made machine tools always have been famous for their neat appearance. Owing to the facility with which European manufacturers copy our designs, there are, roughly speaking, two general classes into which European machine tools may be divided: One of these classes includes such machines as are built according to modern American ideas. These "American pattern" tools, produced on a large scale in Germany, in most cases compare to no disadvantage with American tools and are considerably cheaper, with the result that they have proved extremely popular with European buyers. Consequently, American manufacturers of tools which thus are imitated successfully abroad, either have lost a good deal of their export trade in Europe or have not made any important gain.

The other class into which European machine tools fall, constitutes what are known as "cheap machines". Such machines are not to be compared either with machines made in this country, or with the "American pattern" machinery made abroad. This cheaper machinery commonly is designed for work of general character, in which strict accuracy or maximum production are not required. Good illustrations of this class of machinery are found in the so-called "gap lathes" which are made in large numbers in Germany. The greater portion of the English lathe production also is of this class. These lathes are furnished with almost any variation in design that the customer wants. He can have the lathe with or without gap, with or without hollow spindle and with any distance between centers that he wants. These lathes customarily do not have gear boxes. Lathes of this class normally find a ready sale in all the European countries and are exported to some extent to South America and South Africa.

The case of the milling machine especially is illustrative of this classification. Practically all the milling machines made in Europe are "copies" of prominent American types. All the German manufacturers of milling machines for instance, follow more or less closely the Cincinnati or Brown & Sharpe methods of design. The only French milling machine manufacturer makes what is practically a copy of the Milwaukee miller. The best known German milling machine is one that is made by a concern in Chemnitz that also manufactures typewriters, bicycles and small automobiles. It stands apart from the other German makes as to quality. This manufacturer freely has made use of American features of design, but, in addition, has incorporated some im-

provements, making the resulting machine one which is well suited to the European market; at this plant are made both knee type and Lincoln type millers. These machines, as they come out of the factory, are but little cheaper than American machines delivered in Europe. That is, considering the machines as delivered into the hands of dealers in Europe, there is a difference of from 5 to 7½ per cent in favor of the German manufacturer. The advantage to the German manufacturer is especially small when the high quality single pulley machines which have been made in Germany the past three or four years are taken into consideration.

The remainder of the milling machines manufactured in Germany can be considered in a separate class, which is not to be compared to the make of milling machine alluded to above. A typical machine of this class, made by another Chemnitz manufacturer, is practically an exact duplicate of the Cincinnati miller, to such an extent that it would require an expert to tell the two makes apart. This German duplicate, however, is not the equal of its prototype in workmanship or material, in the accuracy of the machine, or in the accuracy of the production coming from it. The cost price of this machine to the dealer in Germany is considerably cheaper, about 15 per cent, than the cost price of the American machine to the German dealer.

Advantages in Special Machines

OF ESPECIAL significance to American machine tool builders is another phase of the machine tool manufacturing development in Europe, namely, the tendency toward greater specialization in output which has characterized the efforts of foreign makers. In this country it not only is advisable but is essential, under economic conditions, to resolve manufacturing operations into as regular a routine as possible, and to have each workman specialize as much as possible in a certain task. In most machine tool establishments in the United States, the tools generally are run through the various stages of manufacture in groups, instead of one at a time and in this way each machine tool of a certain make is a duplicate of all others of that make. It naturally follows that American manufacturers would not solicit business which calls for a tool that is a radical departure from their regular design, in view of the extra expense to which they would be put in making new patterns and in otherwise departing from the regular routine. The making up of a special tool is an expensive proceeding.

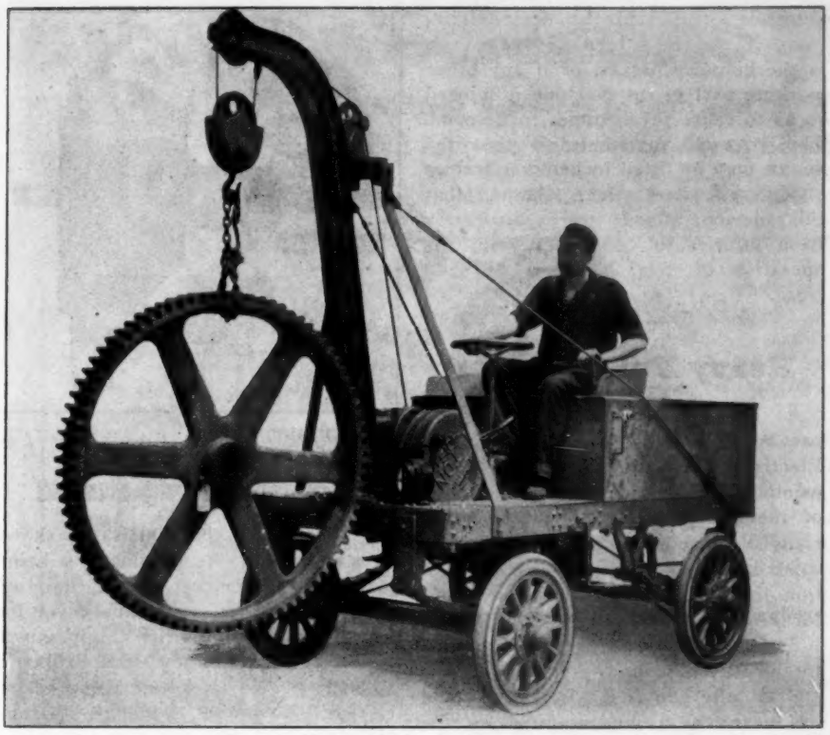
In Europe on the other hand, where labor costs have been lower, it has not been so necessary to adopt highly specialized methods of manufacture, with the result that the products have not been so highly specialized. In Germany, for instance, machine tool manufacturers quite generally, until recently, manufactured a general line of machine tools, rather than specialize in one or a few tools, as always has been typical of American manufacturers. Thus, a German lathe manufacturer in most cases, would be a manufacturer of other kinds of machinery, such as milling machines, drill presses, shapers, etc. At the same time, such a manufacturer, as indicated in the remarks on "gap lathes", would not adhere so rigidly to features of design as would a typical American manufacturer. As a result German and English machine tool manufacturers in numerous cases have shown greater adaptability in meeting the requirements of continental customers. The changed conditions of recent years, however, have led European machine tool manufacturers, particularly in Germany, to specialize their output to one or two different kinds of tools. As an illustration of this statement, in one German city there are four plants which up to the outbreak of the war were specializing in the manufacture of lathes; in the same city there are two manufacturers who practically specialize in milling machines.

In no field is this tendency toward specialization more evident than in the case of engine lathes. Several German concerns up to the commencement of the war were making a specialty of engine lathes and the output of these plants is by no means inferior to the best American engine lathes. In turret lathes the Germans have not made such progress, however. All the German turret lathes are modeled according to American methods, a great many of them being copies of American machines to the last screw. One reason for the lack of progress in the manufacture of turret lathes is that these machines as a rule are made in that country by manufacturers who make a general line of machinery and do not specialize in anything. English turret lathes generally are inferior to those made in Germany; the English lathes, for instance, nearly all are provided with flat ways.

Next to the automatic screw machine, German machine tool makers have been extremely facile in adopting American design in the case of the grinder. Practically all plain and universal cylindrical grinding machines made in Germany are based on the Brown & Sharpe system, in which the work is moved while the wheel base remains stationary. Originally the German machines were far inferior to their American prototypes but in late years these German tools have been greatly improved. Practically the only copy of the Landis type of grinder, in which the wheel base moves while the work remains stationary, recently was put on the market by an English manufacturer. In tool grinders, the Germans have developed an automatic machine for grinding cold saw blades which is said to have but one counterpart here; the Germans also are in the ascendancy in the manufacture of automatic machines for grinding gear hobs. In the manufacture of universal tool grinders this country is considerably in the lead.

While our standard internal grinders are superior to those made abroad, the Germans have made a departure of considerable importance. This is in the development of a grinder for grinding large cylinders or cylinders which cannot be revolved on account of outstanding parts. In these grinders the spindle has a revolving as well as a rotating motion. In addition, due to the development in the use of ball bearings, German makers are somewhat in advance in the manufacture of internal grinding spindles. American manufacturers have been able to do considerable business abroad in special grinders, such as crankshaft grinders, surface grinders, machines for grinding spur gear teeth, etc.

Small bearings that heat can sometimes be helped by flooding with kerosene or gasoline to wash out any dirt, grit or metal particles that may be in them. However, this method must be used with caution for the lubricating oil is also washed away. A large supply of regular lubricating oil must be at once poured in. If on hand, the kerosene should be used in preference to gasoline, as the latter cuts the lubricating oil more quickly.



STORAGE BATTERY TRUCKS EQUIPPED WITH CRANE.

Storage Battery Crane Truck

The Atlas Car & Mfg. Co., Cleveland, has perfected an interesting electrically operated storage battery crane truck for handling heavy weights in and around industrial establishments. The truck which is rigidly built, short and heavy, is equipped with rubber tired wheels. The wheel base is short which enables the truck to be turned easily in a small space. It may, therefore, be conveniently manipulated in shops, warehouses and other buildings where there are machines, castings, etc., in the way. A crane with a radius of four feet is mounted at the forward end of the truck, as shown in the accompanying illustration. It has a lifting capacity of 2,000 pounds and a lifting height of 7½ feet. The boom of the crane may be readily swung from side to side and the hoisting drum is operated by an electric motor. The machine has an over-all width of 5 feet 10 inches and an over-all length of 12 feet 3⅞ inches. The truck is equipped with a draw bar which enables it to haul trailers, thus facilitating the rapid transfer of large quantities of material.

The firm name of the Metallurgic Engineering Co., 53 West Jackson boulevard, Chicago, manufacturer of electric furnaces for steel works and foundries, has been changed to the Snyder Electric Furnace Co., which more clearly describes the business in which the company is engaged. No change has been made in the personnel of the company and the officers continue as follows: President, Frederick T. Snyder; vice president, C. H. Booth; secretary, W. K. Booth, and treasurer, F. E. Berggren.

Book Review

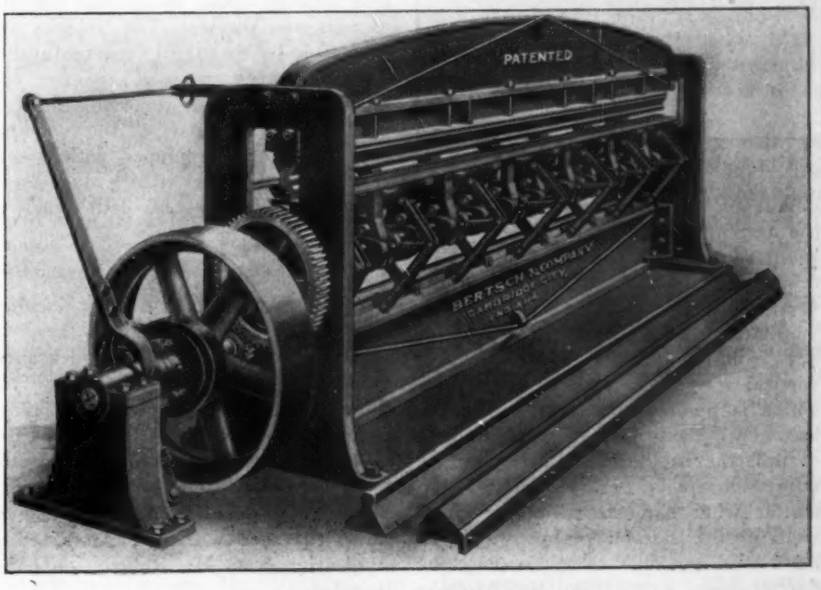
The Manufacture of Iron and Steel, German, ninth edition, 426 pages; published by the Verein Deutscher Eisenhuttenleute, Dusseldorf, Germany, and furnished by *The Iron Trade Review* for $1.50, postpaid.

This work, which now is in its ninth edition, has been almost completely revised to bring to date the discussion of various iron and steel manufacturing processes, etc. The first chapter is devoted to iron ore, coal and coke and the operation of the blast furnace, while in the second chapter the manufacture of wrought iron, steel, etc., is considered. One complete chapter is devoted to iron and steel castings and the testing of iron and steel likewise is considered at length. The second part of this work is devoted largely to statistical features of the world's iron and steel trade and contains considerable valuable data regarding the distribution of iron ore and the production of iron and steel products by all of the civilized nations. The German tariff on iron and steel products also is included.

A feature of this work is a complete directory, by companies and products, of the blast furnaces, steel works and steel foundries of Germany. This directory covers 80 pages and is the most complete of its kind available.

Sheet Metal Forming Machine

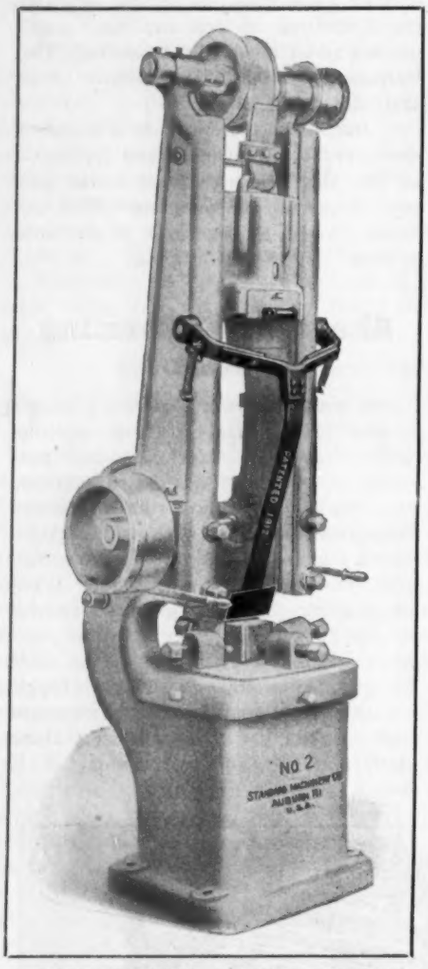
The accompanying illustration shows a new sheet metal forming machine which has been developed and patented by Bertsch & Co., Cambridge City, Ind., for forming ridge rolls and copings of standard or special design. It may also be used for forming valleys, eave troughs and various types of molding. Suitable dies are provided for each class of work. The pressure is delivered against the side forming dies by means of toggle joints. It is said that an operator and a helper can make and nest about 50,000 feet of finished product in 10 hours.



SHEET METAL FORMING MACHINE

Drop Hammer Safety Device

A safety device for drop hammers has recently been developed and patented by the Standard Machinery Co., Auburn, R. I. It is stated that it is adapted for use on plain, automatic or board drop hammers, in cases where it is necessary for the operator to place his hands between dies. The device is not intended for use in connection with hot drop forging operations, because in such cases the work is handled by means of tongs. The



DROP HAMMER SAFETY DEVICE

details of the apparatus are shown in the accompanying illustration. A roller is fitted to the hammer and as it descends, it comes in contact with the vertical tongue of the safety device. The latter pushes the operator's hands out from under the hammer. The vertical tongue is fastened to a yoke which is pivoted to the frame of the hammer. Two springs are provided to pull the tongue back into position after each stroke of the hammer. No matter what happens to the mechanism of the hammer, the operator's hand is pushed away from the danger point every time the hammer descends; it is said the device functions if the belt breaks, if the eye in the hammer breaks, or if any other working part of the machine is injured so as to cause the hammer to descend. The yoke is adjustable so that the device may be fitted to hammer frames of different sizes. It is claimed that this device affords sure protection from injuries in connection with the operation of drop hammers on cold work.

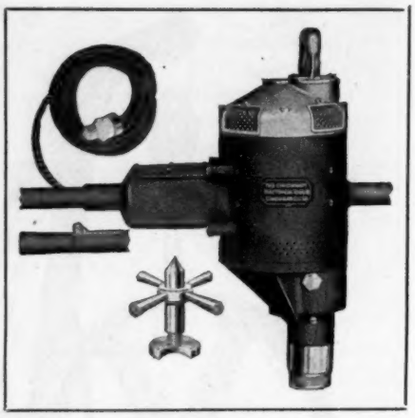
Heavy Duty Reamer

A reamer of a new type recently has been perfected by the Cincinnati Electrical Tool Co., Cincinnati. It is wound for direct current only. It is of the heavy duty type and is especially designed for bridge work, for work in large shops and on construction jobs. It is made in three sizes, for reaming holes 15/16, 1 1/16 and 1 3/16 inches, respectively. The motor is series wound, four pole type, and is fully enclosed. It is air-cooled by means of a fan mounted on the armature shaft. The gears are mounted on roller bearings and are fully enclosed in the lower head of the reamer. They revolve in grease and are separated from the motor housing by means of a plate which prevents oil and grease from getting into the windings. Annular bearings are used on both ends of the armature shaft. The spindle thrust is taken up by means of a thrust ball bearing.

The switch is of special design, of the quick make and break type with the release lever in one of the handles. The brush-holders are mounted on fiber blocks. The binding posts which hold the leads are designed so as to secure contact by means of compression springs, doing away with the use of nuts and screws. The brushes are accessible by means of four removable window guards and it is said they can be replaced without removing the cap or disturbing any part of the machine.

The reamer is equipped with a special type slip socket, which does away with the drift key and drift holes in the spindle.

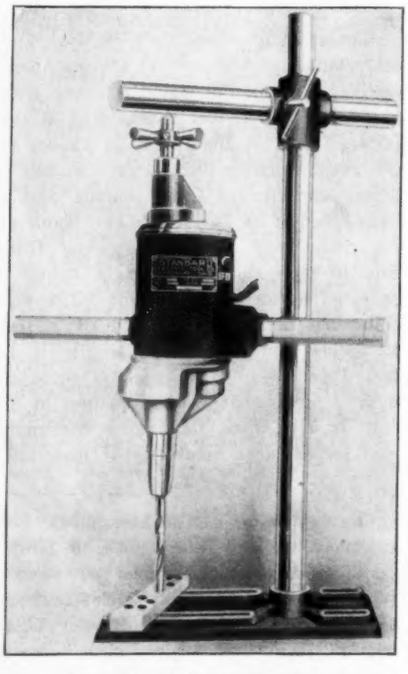
Volume No. 1, No. 1, of *The Scientist*, a publication on iron and steel preservatives, has made its initial appearance. It will be issued regularly by the Goheen Mfg. Co., Canton, O., under the direction of C. J. Robison, chief engineer. The first number contains an interesting article dealing with the general features of metallurgical paint, together with a personal communication from Mr. Robison on paint chemistry.



HEAVY DUTY ELECTRICAL REAMER

New Drilling Stand

The accompanying illustration shows a new drilling stand which is being placed on the market by the Standard Electric Tool Co., Cincinnati, O., for use in connection with high power portable electric screw feed drills. It is made in two sizes, one being adapted for ½, ⅝ and ¾-inch drills, and the other for the ⅞, 1 and 1¼-inch drills. The motor is of the universal type and operates on either direct or alternating current. The machine has ball bearings throughout and the motors are impregnated with an insulating compound. The weight of the smaller size stand is 50 pounds, and that of the larger one is 75 pounds. It is said this attachment is particularly adapted for structural iron workers or for use in any place where a great deal of heavy drilling is to be done with portable electric tools.



NEW DRILLING STAND

Labor Vs. Scientific Management

An Analysis of the Steps Necessary to Convince the Workman That Methods Which Increase Production Are of Benefit to Him

BY ROBERT THURSTON KENT

WE recently have witnessed the brazen attempt of a certain body of gentlemen who style themselves the friends of labor to tack a rider onto the army appropriation bill abolishing scientific management in government arsenals and machine shops.

These ardent champions of the downtrodden would make it a crime to pay a man according to the amount of work he does and if they had their way, making a time study would be equivalent under the law to stealing a watch. That the self-styled labor leaders were simply meddlesome busy-bodies is amply proved by the petition to the senate from 400 employes of the Frankford arsenal at Philadelphia protesting against the abolition of a system of management that had increased their wages by an aggregate of $40,000 annually and improved their working conditions.

At the root of all opposition to scientific management lies ignorance. This article, by one of the country's leading experts on shop efficiency, tells just what scientific management means to the man in overalls and tells you how to introduce the system in your shop without trouble or friction.

IN CONSIDERING the attitude of the workman toward scientific management, it is necessary to take into account only those functions with which the workman comes in contact. All that the workman is concerned with is the actual work which he is called upon to perform or the amount of money which he receives for performing it. The work laid out by the planning department of a scientifically managed shop for a given workman is known as a task. One of the fundamental principles of scientific management is that each workman shall daily have laid out for him a carefully circumscribed task calling for a full day's work. Another fundamental principle is that the workman shall be sure of receiving higher pay than his ordinary daily wage, if this task is accomplished, in the shape of a bonus or a high piece rate; and, furthermore, that he shall suffer a loss if he fails to accomplish the task.

The workman, as a rule, is not interested in other details of scientific management. The routing of the work, the scheduling of the various orders, the keeping of time and costs, and other details which are a necessary part of scientific management, are not of the slightest interest to him, except where they affect the task or influence the size of his pay envelope. In discussing the attitude of the workman toward scientific management, therefore, we can confine ourselves largely to the consideration of the task and the payment of wages.

One of the characteristics of the progress of the scientific management movement has been the almost universal opposition of the labor unions to it. Almost without exception the labor leaders have fought it by every means in their power and have presented to their followers the wildest mis-statements, to put the case mildly, which are the result either of ignorance or deliberate attempts to deceive. Chief among these may be cited (a) that scientific management is a device for speeding the workmen without any remuneration for their increased effort; (b) that it actually is a device for lowering wages; (c) that it substitutes low grade, unskilled labor for the skilled, highly trained workmen; (d) that it saps the manhood and destroys the initiative of the worker; (e) that it is a most unfair system in that the workmen have nothing whatever to say about the fixing of the rates or the conditions under which they work.

Despite the fact that the above assertions are all untrue, nevertheless they are believed by a large percentage of the workmen, and the employer contemplating the adoption of scientific management in his establishment must take into consideration the effect that the beginning of the new system will have upon his men, for, the labor union leader to the contrary, notwithstanding, scientific management cannot be installed nor can it ever succeed until there is close co-operation between employer and the workmen. While the union leader may and does claim that the workmen have no voice in the setting of tasks and the fixing of wages, the fact remains that tasks are set as a result of studies made on the men and with the co-operation of the men while at their usual daily work. Wages are fixed at a point which will enable the workmen to earn from 30 to 50 per cent more than the prevailing scale of wages for their respective trades in that vicinity. This being the case, it is idle to argue that workmen have no voice in the determination of tasks and wages. Without their co-operation no task could be set and surely the prevailing wage scale of the vicinity has not been fixed without the consent of the men. The other contentions of the union leaders against scientific management can be disposed of just as easily although it probably is futile to attempt to argue with them. Perhaps the best way for a manufacturer to convince his workmen that scientific management is not the evil thing that the workmen's leaders have attempted to lead them to believe it is, is to carefully explain to the men or group of men who are first to come in contact with the workings of the system, the exact method of fixing tasks and setting rates. The outline of the methods as they relate to the workmen is given below:

Under scientific management the task is invariably based upon time study. Let it be clearly understood here that time study as known to scientific management is not simply holding a watch and noting the elapsed time which intervenes from the time that a workman starts a job until he finishes it. It involves a careful analysis of every job into its fundamental elements and a study of these elements to ascertain which are necessary and useful and which are superfluous and can be eliminated. After this analysis, the useful elements are combined to form an improved method which is considered the standard method for that particu-

lar work until a better one is discovered by a similar process of reasoning. Such an analysis, elimination and combination of useful elements to form a standard method requiring less time and effort than the previous method is shown in two time studies exhibited on the observation sheet, Fig. 1. This is a reproduction of one of the illustrations of George D. Babcock's paper before the National Metal Trades Association in April, 1914, and published in *The Iron Trade Review* July 23, 1914. It indicates how the time study and analysis reduced the number of fundamental operations for drilling a differential gear section from 22 to 8 with a reduction in the time required from 8.69 minutes to 3.77 minutes.

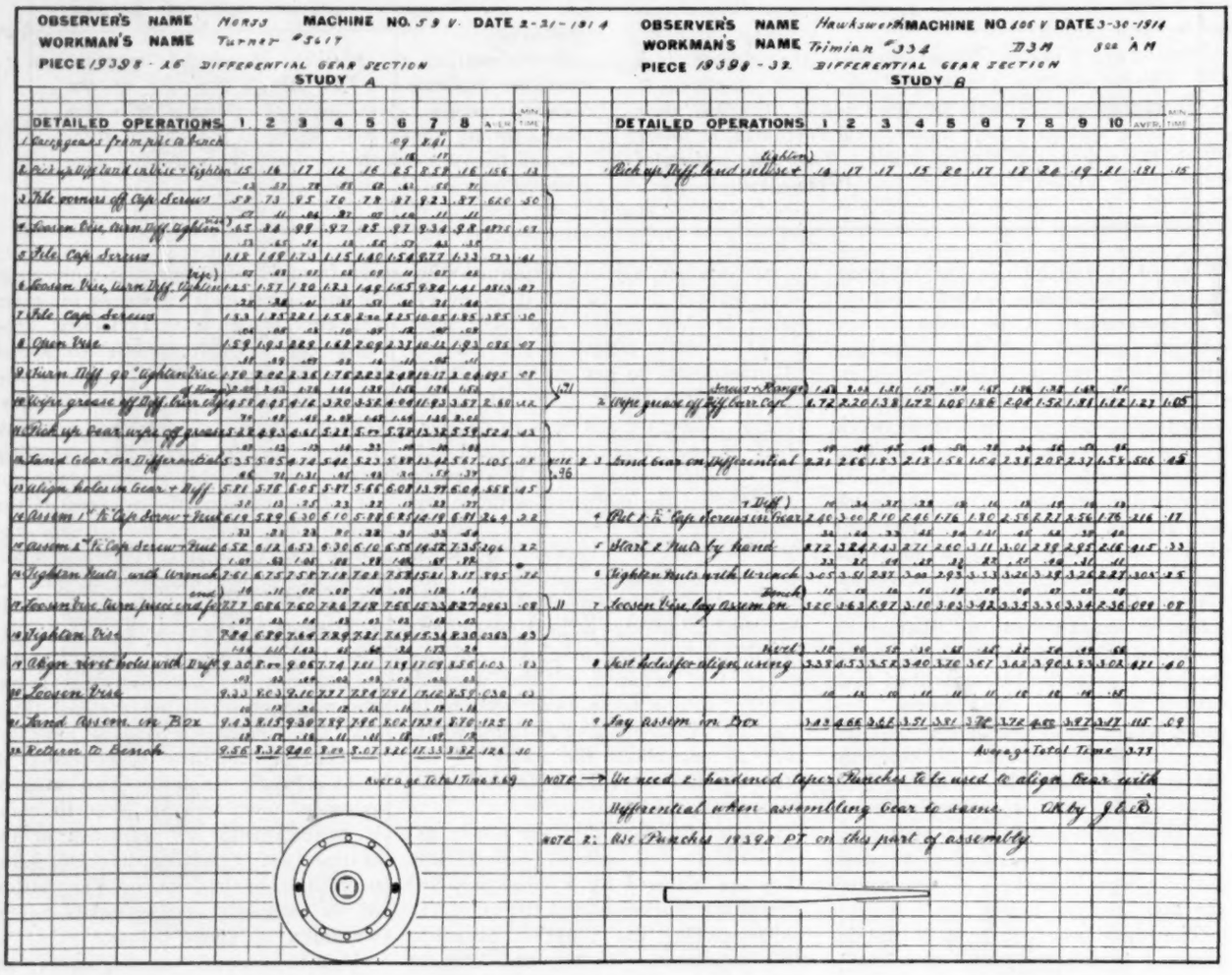

OBSERVER'S NAME Norris MACHINE NO. 59 V. DATE 2-21-1914
WORKMAN'S NAME Turner #5617
PIECE 19398 - 26 DIFFERENTIAL GEAR SECTION
STUDY A
DETAILED OPERATIONS
OBSERVER'S NAME Hawksworth MACHINE NO. 105 V DATE 3-30-1914
WORKMAN'S NAME Timian #334
PIECE 19398 - 32 DIFFERENTIAL GEAR SECTION
STUDY B
DETAILED OPERATIONS
NOTE → We need 2 hardened taper Punches to be used to align Gear with Differential when assembling Gear to same. Okby J.L.B.
NOTE 2: Use Punches 19398 PT on this part of assembly

FIG. 1—OBSERVATION SHEET SHOWING TIME STUDIES OF TWO DIFFERENT METHODS OF DOING THE SAME JOB

After the standard method has been determined, the time required for performing each element is noted by means of the watch in the hands of a competent time study observer, not once, but many times, until a fair unit time for each operation can be ascertained. The standard method and the standard times of all elements entering into the method are then placed upon a permanent record and issued to the men who have to perform this particular job in the shape of an instruction card. This standard procedure is known as the task for the particular job to which it relates, and the time given is the task time within which the workman must do the job in order to earn his bonus or high rate of pay.

If the workman follows the order of the instruction card and performs his job in the sequence given by it, he can seldom fail to accomplish his task in the allotted time. It is, of course, to be understood that the employer furnishes the workman with the same facilities and conditions for performing his work as a matter of routine, that existed when the time study which determined the task was made. This is one point which must never be forgotten.

Scientific management is based upon the square deal. It must be fair alike to employe and employer, and once it departs even in the slightest degree from the square deal it is no longer scientific management but a source of dissatisfaction and trouble. It is no square deal to determine a task under certain favorable conditions and then require it to be performed under different and more difficult conditions. If the employer does this, the workmen have just grounds for dissatisfaction and the employer is laying up for himself distrust, suspicion and future trouble.

The workman should be clearly given to understand that the time study which results in decreasing the time required for a job, as in the instance cited above, does not necessarily mean that the workman has been "speeded" and subjected to great exertion. On the contrary, the exertion required of him usually is less than it was before the time study was made for the reason that the number of laborious movements which he is required to make has actually been reduced. In the two studies illustrated an examination will show that the workman was relieved of the necessity of opening the vise several times, as well as eliminating a

number of other operations. This instance is sufficient answer in itself to the claim that time study and scientific management are devices for speeding the workman to the injury of his health.

Under scientific management, in its ultimate refinement, each workman is required to do only that work for which he is best fitted. It is considered not part of a machinist's job, for instance, to fetch and carry castings. Consequently this work will be done for him by laborers and the machinist will devote his time entirely to the manipulation of his machine. It is the work at which he can receive the highest wages and it is also the work at which he receives the maximum profit to his employer. It is to their common interest, therefore, that he be enabled to do only machine work while his raw material in the shape of castings, forgings, etc., tools with which he works, his drawings, instruction cards, and other necessary equipment are brought to him by lower priced men.

So far as the workman is concerned, therefore, scientific management calls for his attending strictly to business in the trade for which he is best equipped and attending to this business in the manner which a scientific analysis and study, in which he or his fellows had co-operated in making, has determined to be the best method. When he does this, the effect upon his pay envelope is immediate. He receives from 30 to 50 per cent more money than he would were he working under day wages.

The above statements can be confirmed by anyone who cares to interview workmen in a plant which is acknowledged as a representative scientifically managed plant. It was the writer's privilege to interview a number of men in one such plant. It was a curious commentary on the contentions of labor leaders that scientific management is a device detrimental to the interests of the workman in that not one of the men interviewed realized that he was working under any particular system of management nor did they feel that they were working at an extraordinarily high rate of speed. The men interviewed ranged from men who had been in the employ of the company for many years and who had worked under both scientific management and the old style management and to men who had been in the employ of the company but a few months.

Questioned as to whether or not they had to work harder than they formerly did or than they had to work in other shops, the uniform answer was that they had to work no harder, but their work was steadier. They had no intervals in between jobs when they or their machines were idle, and as they were always supplied with plenty of work ahead and with proper tools and other equipment they were relieved of numerous petty vexations which were really more fatiguing than the actual work itself. The thing that interested them one and all was the fact that they were enabled to earn much higher wages than they formerly could. They were actuated by no false sentiments regarding loyalty to their employer, but were almost unanimous in declaring that they preferred their present jobs to others which they could obtain in the vicinity because they were able to earn more money. The pay envelope and its contents was the one thing that interested them. They quite frankly declared that even if they had to perform more manual labor and become more fatigued by the end of the day in another plant, they would endeavor to secure employment in that plant if they thereby could receive a greater amount of money for their day's work.

It would seem, therefore, from testimony of these men who are well qualified to speak, that scientific management has no terrors for the workman who understands it. He does not realize that he is the victim of a conspiracy to squeeze the last drop of blood from him and to exact the last pound of flesh.

An instance may be given to show how little the labor leaders really

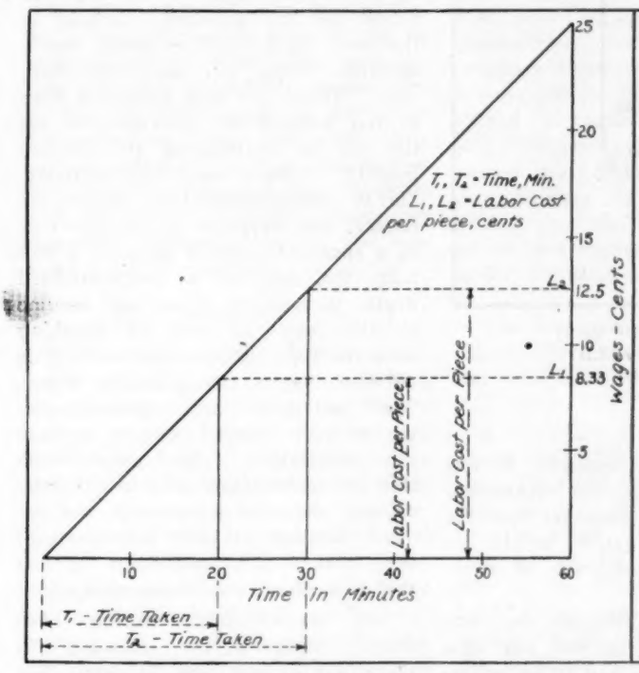


FIG. 2—VARIATION IN LABOR COST FOR THE SAME JOB DONE BY DIFFERENT MEN PAID THE SAME DAILY WAGE

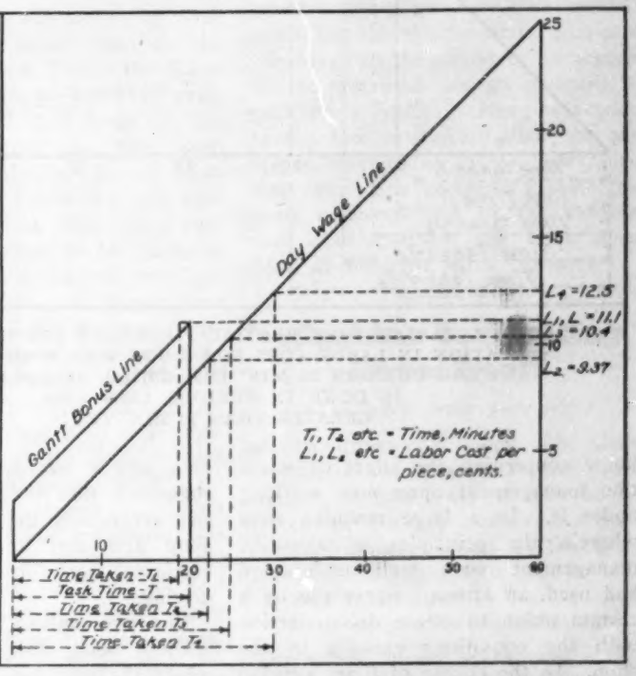


FIG. 3—GANTT BONUS SYSTEM VARIATION IN LABOR COST OF A JOB WHICH SHOULD BE DONE IN 20 MINUTES AND IS ACTUALLY DONE IN PERIODS LESS AND GREATER THAN 20 MINUTES

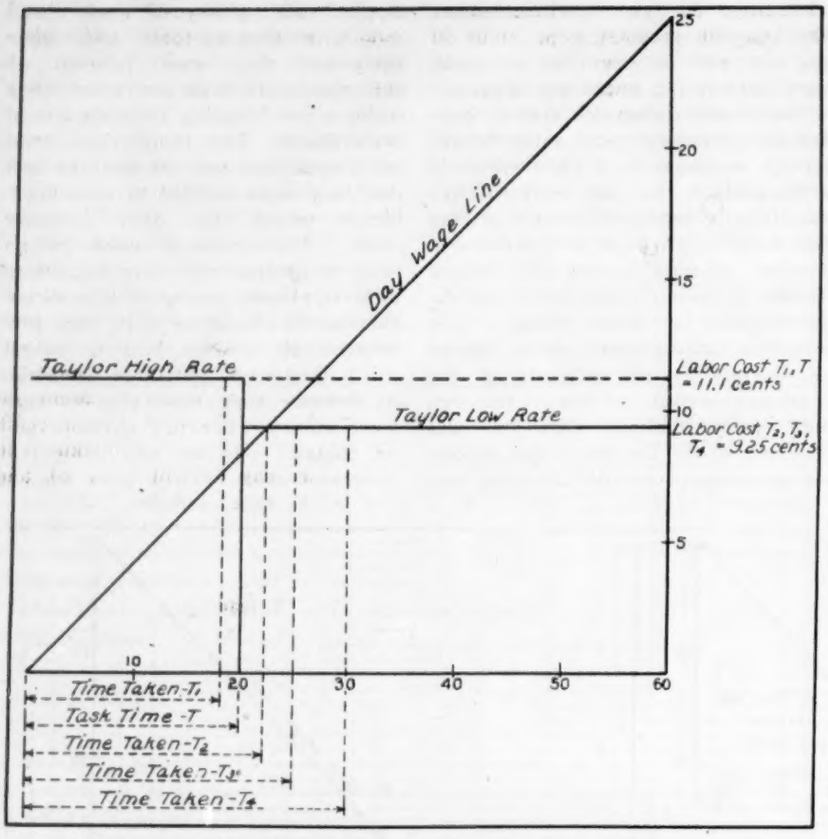


FIG. 4—TAYLOR DIFFERENTIAL PIECE-RATE SYSTEM VARIATION IN LABOR COST FOR A JOB WHICH SHOULD BE DONE IN 20 MINUTES, WHICH ACTUALLY IS DONE IN PERIODS LESS AND GREATER THAN 20 MINUTES

know concerning the effect of scientific management upon men working under it. In a large machine shop wherein the principles of scientific management were well understood and used, an attempt was made by a certain union to create dissatisfaction with the conditions existing in the shop. In the course of time, a union representative called upon the manager and proceeded to lay the law down to him. He informed the manager that the men were being abused by the rigorous conditions under which they were compelled to labor and that his union did not propose to stand for the driving of its members to the point of exhaustion. He further declared that the men in the shop were under a set of task masters who compelled them to do three to four times the ordinary amount of work under severe penalties and the thing had to be stopped. The manager expressed surprise at the fact that such conditions could exist in the shop without his knowledge. Certainly it had never come to his attention that men were forced to the point of exhaustion, and he agreed with the union's representative that if matters were as he stated, the situation should be looked into at once and a remedy applied. It was suggested that the union representative accompany the manager into the shop and they together would investigate any alleged case of overdriving.

The two walked through the shop without being able to find any case where the men appeared to be suffering from overwork and where they were on the verge of exhaustion. Finally the manager stopped at a large lathe which was taking a heavy cut and which was apparently the hardest worked machine in the shop. A few questions to the workman brought forth information that the output of the machine at present was about three times what it had been before the shop had come under the principles of scientific management. This looked like something tangible for the union's representative to take hold of. Here was a man who was compelled to turn out three times as much work as he formerly did. The manager, however, picked up the instruction card covering the job and suggested that they go through the operations it called for. The manager inquired if the union would consider it unreasonable if he required the belt to be placed upon a certain step of the cone pulley or that the back gears should be thrown in. The union representative agreed that there was nothing unreasonable in this requirement. "Is there anything wrong, then," inquired the manager, "in asking the workman to use a particular tool, ground to shape by the grinding machine in the tool room?" The union representative could not say that there was. "Have you any objection then to our asking the workman to set the tool in his machine at a certain height?" None was forthcoming. "Is it unreasonable that we should request the workman to set the tool in a specified distance so that it will take the cut of a predetermined depth, particularly if we will assume in this case all risk of breaking both the tool and the machine?" This did not seem unreasonable either. "Can you devise any argument why the workman should not put in mesh the combination of feed gears which this instruction card calls for, thereby causing the tool to advance the desired distance at each revolution of the work?" No argument against this procedure was forthcoming.

"All these things having been done," continued the manager, "is there any reason why I should not now ask the workman to move his belt shifter, thereby causing the machine to begin work?" The union representative admitted that it would be eminently proper at this time to put the machine in motion. "Well, then," demanded the manager, "will you kindly tell me wherein the union has a right to object to scientific management on the ground that it is driving workmen beyond their strength. You have picked out the

EARNINGS AT VARIOUS RATES OF PRODUCTION.

Time per piece minutes.	Pieces per day.	Labor cost per piece, cents. Day wage.	Gantt bonus.	Taylor differential.	Man's earnings per day, dollars. Day wage.	Gantt bonus.	Taylor differential.
18.75	32.0	7.81	11.1	11.1	2.50	3.55	3.55
20.00	30.0	8.33	11.1	11.1	2.50	3.33	3.33
22.5	26.6	9.37	9.37	9.25	2.50	2.50	2.46
25.0	24.0	10.41	10.41	9.25	2.50	2.50	2.22
30.0	20.0	12.50	12.50	9.25	2.50	2.50	1.85

hardest worked man in the place and you have yourself stated that there is nothing unreasonable in what scientific management requires him to do. I cannot see that you or your union has any ground for complaint." The argument was unanswerable, and the union leader dropped the subject and closed the incident as quickly as possible.

This incident illustrates practically the only manner in which the workman comes in contact with scientific management in practice. The principal difference is that under scientific management his instructions are in writing while under the old style of management they are usually verbal instructions from his boss. If the workmen are clearly given to understand that scientific management has no more effect upon their habits or methods of working than was the case in the exhibition, above described, for the benefit of the union representative, they will offer little or no objection to the introduction of scientific management. Trouble with the workman usually arises from imperfect understandings of the motives of their employer.

Rates Must Not be Cut

Another thing that must be made clear to the men is that scientific management is not to be used as a device by which their production can be increased after which their rates will be cut, bringing their earnings back to the same point as before. The workman is entirely suspicious and he has good reason to be so. From time immemorial he has been induced to speed his work only to be met with a cut in his piece rate, which has left him as badly or worse off than before. Workmen must be given an absolute guarantee that once a rate is fixed by time study it will not be cut unless the method is changed or obvious errors in the time study manifest themselves. In the latter event, no new rate should be made without a new time study, in which, as above explained, the workmen will co-operate. Once assured that he can go ahead and earn all money possible under the new order, the workman will usually become enthusiastic regarding the benefits of scientific management to himself. Nor need the employer have any fear that men will be making excessive wages. If the time study has been made accurately, there will be no possibility of the wages of the workmen rising to a point in excess of his value to the company. It is true that he will be earning from 30 to 50 per cent more than ordinarily, but on the other hand, the cost of production per unit of product will be lower for the employer, as a reference to the accompanying wage diagrams will show.

The charts are based upon a daily wage rate of 25 cents per hour. Fig. 2 shows the respective labor cost per piece if the work is done by two workmen, one of whom accomplishes the job in 20 minutes and the other in 30 minutes. Although the one is only two-thirds as efficient as the other, the earnings of both men for the day are identical; namely, $2.50.

Referring now to Fig. 3, we see the effect on the workman's earnings of fixing a task and paying him for its accomplishment. Assume that the time study has shown that a fair task time is 20 minutes,—the time required by the better man in the previous illustration. Under the Gantt bonus system, the workman is guaranteed his regular daily wage for the job, irrespective of the time consumed in accomplishing it. If, however, he does the job in the task time or less than the task time, he is paid an amount equivalent to his earnings under day wage for the task time and in addition a bonus of 33 per cent of the task time. In the case illustrated, the workman accomplishing the job in 20 minutes will receive 8.33 cents, his regular daily wage, and an additional bonus of 2.78 cents. If he accomplishes the task in less than the task time, say 18.75 minutes, he will still receive 11.1 cents for the piece. If he continues this rate of production throughout the day of ten hours, his earnings will be $3.55, as against his former daily wage of $2.50. If, on the other hand, the workman fails to accomplish his task within the 20 minutes allowed, he will be paid only his day rate. If he consumes 30 minutes for the job, his earnings will be $2.50 and the labor cost per piece 12.5 cents. The labor cost if he earns his bonus will be but 11.1 cents. This illustrates the advantage both to the employer and employe of fixing a task and paying for its accomplishment.

Fig. 4 illustrates another method of paying workmen, the Taylor differential piece-rate, which accomplishes the same results for employer and employe when the task is accomplished, but has the difference that when the employe fails to accomplish the task in the time set, he automatically receives a much lower rate of wages than he otherwise would and if he falls far short of the task time, his earnings are lower than they would be if he were employed at steady day work The Taylor differential rate is a straight piece work system. The piece price is fixed one-third higher than the equivalent daily wage earnings. Thus, the labor cost and earnings of the workman are identical with those of the Gantt bonus when the task is fulfilled. If the workman fails to accomplish his task, he will, under the Taylor differential bonus, receive a piece price which is five-sixths of the higher piece rate. The effect of this upon the earnings of the men is seen by reference to the diagram, Fig. 4. If the workman consumes 30 minutes to accomplish a 20-minute task, he will receive but 9.25 cents per piece. Instead of making 30 pieces per day he will make 20, and his daily wage will be $1.85. The labor cost per piece will be but 9.25 cents, but this will be of no particular advantage to the employer on account of the overhead charge accruing to each piece being greater on account of the low production than the saving in wages, due to the lower piece rate cost. The accompany table presents a comparison of the earnings and labor cost on the same piece, done at different rates of speed.

Machine for Cutting Bevel Gears

(*Continued from page* 465.)

and is driven by a key. The blades are fitted into the cutter head with wedges, so that they all can be adjusted to cut on exactly the same radius from the center of the cutter spindle. An indicator is used in making this adjustment.

Following are the specifications:

Longest cone distance of any gear that can be cut, in.	9¾
Shortest cone distance of any gear that can be cut, in.	0
Greatest pitch angle of any bevel gear, deg., min.	81–53
Least pitch angle of any bevel gear, deg., min.	8–7
Extreme ratio of any bevel gear	7:1
Greatest pitch dia. of a 7:1 ratio bevel gear, in.	19.3
Greatest pitch dia. of a 2:1 ratio bevel gear, in.	17.4
Greatest pitch dia. of a 1:1 ratio bevel gear, in.	13.8
*Largest diametral pitch	3
*Smallest diametral pitch	7
Greatest length of face	⅓ of the cone distance
Greatest distance from center of machine to nose of spindle, in.	15
Fastest cutter speed per minute, ft.	80½
Slowest cutter speed per minute, ft.	28
Fastest time in which one side of one tooth can be cut, sec.	34
Slowest time in which one side of one tooth can be cut, min., sec.	2–38
Dia. of drive pulley, in.	16
Width of drive belt, in.	4
Dia. of tight and loose pulleys on countershaft, in.	12
Speed of countershaft, revolutions per minute	400
Horsepower of motor if required	7½
Net weight, pounds (estimated)	10,200
Gross shipping weight, pounds, estd.	11,750
Floor space, in.	110 x 100
Height, in.	66¾

*The limits of pitch here given are for standard finishing cutters. Spiral cutters would allow a slightly greater range.

Shipments of Lake Superior Ore

Official Statistics of Shipments by Mines, Ranges, Ports and All-Rail in 1914—Decrease From Previous Year Was 34.47 Per Cent

BY R V SAWHILL

THE official figures just compiled by *The Iron Trade Review* showing shipments of iron ore from the Lake Superior district in 1914, reveal with striking particularity the extent of the decline in the ore trade last year. Total shipments were 32,729,726 tons, compared with 49,947,116 tons in 1913, a decline of 17,217,390 tons, or 34.47 per cent.

The lake movement in 1914 was 32,021,897 tons, against 49,070,478 tons in 1913, a loss of 17,048,581 tons. The all-rail shipments last year were 707,829 tons, a decline of 168,809 tons from 1913, when they totaled 876,638 tons.

The total shipments in 1914 were the lowest of any year since 1904, with the exception of 1908. They fell below 1911 by 64,000 tons. The all-rail movement was higher than in 1908 and 1911, but with those exceptions was lower than in any other year since 1904.

For the third successive year the independent ore mining companies shipped more than half of the tonnage. Their percentage of the total shipments in 1914 was 50.99, a fractional gain over 1913, when they shipped 50.94 per cent of the total. In 1912 their percentage was 50.54. In one other year since 1905, the independents have shipped more than half the season's tonnage, that being in 1910, when their percentage was 50.14. In 1907 and 1908 they shipped only 44 per cent, while in 1906 their percentage was 47. In 1909 they shipped 49.64 per cent and in 1911, 47.3 per cent. Their record of having shipped more than half of the season's tonnage in four out of the last five years demonstrates clearly the strength of the independent ore interests.

Shipments by the United States Steel Corporation under the "Hill lease," which was surrendered at the close of 1914, totaled 6,013,758 tons, or slightly more than the minimum movement of 6,000,000 tons provided for under the terms of the lease. Shipments under this lease in 1907 were 137,270 tons; in 1908, 508 tons; in 1909, 41,624 tons; in 1910, 2,152,977 tons; in 1911, 5,499,759 tons; in 1912, 7,490,509 tons, while in 1913 they were 5,236,889 tons. Shipments by mines in gross tons under the "Hill lease" for the last three years were:

	1914.	1913.	1912.
Fay	27,673	296,058	262,070
Leonard	2,686,285	1,253,479	2,198,119
Mississippi	507,660	122,984	274,729
Uno North	90,088	381,805	545,033
Uno South	945,840	1,202,454	1,305,216
Dale	423,711	621,496	1,106,808
Mace	160,815	141,241	136,524
Harold	489,042	92,060	187,926
Hill	592,590	846,662	1,188,908
North Star	90,054	278,646	285,176
Total	6,013,758	5,236,889	7,490,509

The following table shows the shipments and percentage of the Oliver Iron Mining Co., the Steel Corporation's mining organization, since 1905:

Year.	Gross tons.	Percentage.
1906	20,414,811	53.00
1907	22,710,898	56.00
1908	14,123,957	56.00
1909	21,397,866	50.36
1910	21,661,143	49.86
1911	17,282,499	52.70
1912	23,845,363	49.46
1913	24,502,244	49.06
1914	16,039,654	49.01
Total	181,978,435	51.04

Shipments from the Mesabi range in 1914 were 21,465,967 tons, against 34,038,643 tons in 1913, a decrease of 12,572,676 tons. Its percentage of the total shipments was 65.62, against 68.15 in 1913, 66.46 in 1912 and 67.37 in 1911. The Gogebic range was the second largest shipper in 1914, forwarding 3,568,482 tons, against 4,531,558 tons in 1913, a decrease of 963,076 tons. Its percentage in 1914 was 10.90, against 9.07 in 1913, 10.38 in 1912 and 7.94 in 1911. The Menominee range which ranked second in 1913 was third last year, forwarding 3,221,258 tons, against 4,965,604 tons in 1913, a decline of 1,744,346 tons. Its percentage was 9.83, against 9.94 in 1913, 9.77 in 1912 and 11.93 in 1911. The Marquette range forwarded 2,491,857 tons, against 3,966,680 tons in 1913, a decline of 1,474,823 tons. Its percentage was 7.61, against 7.94 in 1913, 8.71 in 1912 and 8.64 in 1911. Vermillion shipments were 1,016,993 tons, against 1,566,600 tons in 1913, a decline of 549,607 tons. Its percentage was 3.10, compared with 3.14 in 1913, 3.83 in 1912 and 3.32 in 1911.

The older ranges, Marquette and Menominee, showed the most striking decline in shipments. With the exception of 1908, Menominee shipments in 1914 were the lowest of any year since 1898. Again excepting 1908, Marquette shipments were the lowest in 19 years, or since 1895.

The Cuyuna range showed an increase, the 1914 movement being 859,404 tons, against 733,021 tons in 1913, a gain of 126,383 tons. Its percentage of the total movement was 2.62, against 1.47 in 1913, 0.63 in 1912 and 0.45 in 1911.

Only four mines shipped more than a million tons each last year, they being the Leonard, Mahoning, Sauntry-Alpena and Canisteo, all on the Mesabi. In 1913 there were 11 mines which reached this figure, they being the Adams, Canisteo, Fayal, Genoa, Hull-Rust, Leonard, Mahoning, Sauntry-Alpena and Uno South on the Mesabi and the Newport and Norrie Group on the Gogebic. In 1912, 11 miles also shipped more than a million tons, they being the Canisteo, Dale, Genoa, Hill, Hull-Rust, Leonard, Mahoning, Sauntry-Alpena and Uno South on the Mesabi; the Norrie Group on the Gogebic and the Cleveland-Cliffs Group on the Marquette. Six attained that figure in 1911, they being the Canisteo, Dale, Hill, Leonard, Mahoning and Sauntry-Alpena, all on the Mesabi. In 1910, nine mines shipped more than a million tons each, the Adams, Burt, Canisteo, Fayal, Hull-Rust, Mahoning and Morris on the Mesabi and the Newport and Norrie Group on the Gogebic.

The Leonard was the leading shipper last year with a record of 2,686,285 tons. The Hull-Rust mine, which shipped 3,457,608 tons in 1913, the fifth year it had shipped more than

COMPARATIVE SHIPMENTS BY RANGES, 1914 AND 1913.

	1914.	1913.	Decrease.
Mesabi	21,465,967	34,038,643	12,572,676
Menominee	3,221,258	4,965,604	1,744,346
Gogebic	3,568,482	4,531,558	963,076
Marquette	2,491,857	3,966,680	1,474,823
Vermillion	1,016,993	1,566,600	549,607
Cuyuna	859,404	733,021	†126,383
Mayville and Baraboo	105,765	145,010	39,245
Totals	32,729,726	49,947,116	17,217,390
By lake	32,021,897	49,070,478	17,048,581
By rail	707,829	876,638	168,809

†Increase.

OFFICIAL RECORD OF SHIPMENTS FROM LAKE SUPERIOR DISTRICT IN 1914 AND 1913

MESABI RANGE

	1914.	1913.		1914.	1913.		1914.	1913.		1914.	1913.
Adams	286,522	1,580,196	Genoa	476,972	1,141,673	Leonidas	232,416	.....	Sauntry-Alpena	1,131,255	1,705,131
Adriatic	74,911	110,534	Gilbert	1,300	104,538	Lincoln	207,251	215,957	Schley	16,386	202,477
Agnew	108,558	101,549	Glen	.....	15	Longyear	.....	11,799	Scranton	20,205	227,270
Albany	227,766	345,162	Grace	98,667	122,110	Mace	160,815	140,953	Section 17	.....	16,646
Alberta	.....	5,219	Graham	229,940	100,289	Madeira	.....	2,805	Sellers	.....	268,070
Allan	24,724	50,222	Grant	111,443	687,987	Madrid	9,951	86,053	Seville	3,908	24,114
Bangor	91,189	119,705	Hanna	83,940	264,318	Mahoning	1,212,287	1,515,428	Shenango	546,519	794,911
Belgrade	155,012	.....	Harold	489,042	92,054	Malta	.....	93,632	Shiras	5,206	.....
Bennett	25,868	88,931	Harrison	154,732	.....	Meadow	38,750	25,106	Sliver	197,041	298,006
Biwabik	255,255	300,924	Hartley-Burt	.....	7,506	Mesabi Chief	.....	2,023	Spruce	488,870	544,876
Bray	.....	102,439	Hawkins	232,354	568,919	Miller	297,379	344,547	St. Paul	.....	1,375
Brunt	.....	202,969	Helmer	151,803	25,641	Minnewas	5,798	.....	Stevenson	89,899	634,656
Burt	213,433	622,951	Higgins, No. 1	1,102	.....	Minorca	85,541	90,837	Susquehanna	906,913	904,019
Canisteo	1,051,895	1,099,727	Hill	592,590	855,965	Missabe Mt	5,347	321,835	Troy	.....	70,748
Cavour	16,837	118,404	Hill Annex	3,272	.....	Mississippi	507,660	122,972	Union	244,436	286,934
Chisholm	399,500	641,788	Holland	11,048	.....	Mohawk	35,050	171,849	Uno North	90,088	381,632
Clark	392,530	402,893	Holman	497,276	751,422	Monica	46,922	62,032	Uno South	945,840	1,202,341
Commodore	372,796	484,188	Hudson	127,526	240,513	Monroe-Tener	.....	485,847	Utica	247,714	352,932
Corsica	99,613	225,140	Hull-Rust	458,468	3,457,608	Morris	365	.....	Virginia (P. M. & Co.)	31,233	391,109
Crescent	.....	1,022	Iroquois	14,334	111,159	Morrow	.....	91,512	Vivian	14,993	9,093
Crosby	.....	219,065	John Jr.	.....	15,461	Morton	339	29,989	Wacootah	36,839	43,549
Croxton	982	50,033	Judd	95,416	103,495	Myers	.....	39,951	Wanless	3,808	.....
Cyprus	45,205	82,121	Kinney	347,456	396,394	Norman	261,062	276,732	Webb	151	236,579
Dale	423,711	621,415	Knox	.....	20,123	Onandaga	.....	6,847	White Iron	.....	7,957
Deacon	87	.....	La Belle	.....	10,038	Pearce	.....	123,948	Whiteside	242,996	76,897
Duncan	5,177	.....	Larkin (Tesora)	.....	69,200	Pearson	.....	104,180	Wil'ms (N.Cin.)	.....	76,703
Eaton	.....	3,548	La Rue	24,700	172,337	Perkins	18,182	120,012	Winifred	10,449	43,109
Elba	147,796	126,236	Laura	198,665	184,530	Pettit	120,868	131,864	Woodbridge	71,440	163,757
Elizabeth	.....	17,105	Leetonia	551,022	501,248	Prindle	12,392	.....	Yawkey	.....	40,878
Fayal	673,643	1,257,430	Leonard	2,686,285	1,253,367	Quinn	49,251	.....			
Fowler	12,364	72,087	Leonard-Burt	21,190	2,862	Roberts	.....	13,387			
Franklin	28,885	51,760	Leonard-Glen	2,135	.....	Ruddy	15,215	35,242	Total	21,465,967	34,038,643

MENOMINEE RANGE

	1914.	1913.		1914.	1913.		1914.	1913.		1914.	1913.
Antoine (Clifford)	66,329	95,310	Chicagon	114,848	137,002	Groveland	.....	9,251	Pewabic	299,228	364,176
Aragon	188,765	230,958	Commonwealth (Buckeye)	47,281	128,214	Hemlock	46,449	110,511	Ravenna	49,309	70,763
Armenia	50,501	83,142	Cortland	15,318	19,332	Hiawatha	91,369	160,510	Richards	7,069	46,170
Baker	113,733	24,286	Crystal Falls	.....	7,389	Hilltop	8,223	.....	Riverton Group	176,233	160,818
Baltic	29,206	130,631	Cundy	.....	2,543	Hollister	16,429	25,251	Rogers	27,080	.....
Bengal	5,539	23,259	Davidson	122,567	195,448	James	73,832	188,966	Tobin	65,351	154,896
Berkshire	23,824	.....	Dunn	52,883	14,912	Judson	6,619	.....	Tully	63,411	16,650
Bristol (Claire)	172,034	379,168	Ernst	40,437	.....	Loretto	45,449	158,257	Virgil	5,913	48,945
Calumet	.....	18,976	Fairbanks (Paint River)	.....	2,289	McDonald	.....	16,499	Vivian	.....	27,177
Carpenter	51,146	.....	Florence	680	.....	Mansfield	.....	190,503	Wickwire	25,329	47,697
Caspian	279,379	295,841	Fogarty	15,329	124,568	Michigan	9,471	27,917	Youngs	.....	44,091
Chapin	340,722	370,211	Forbes	77,960	69,435	Millie	361	.....	Zimmerman	172,720	150,817
Chatham	19,454	107,608	Gt. Western	.....	50,465	Munro	.....	18,508			
						Penn. Iron Mining Co.	203,478	416,244	Total	3,221,258	4,965,604

MARQUETTE RANGE

	1914.	1913.		1914.	1913.		1914.	1913.		1914.	1913.
Adams (Amer. Min. Co.)	.....	1,504	Group	673,160	997,520	Maas	55,903	170,705	Queen Group	178,574	298,504
American (Sterling)	85,093	162,253	Empire	.....	38,534	Mary Charlotte	69,056	264,120	Republic	52,562	137,063
Austin	30,493	107,366	Gwynn	20,158	.....	Milwaukee-Davis	.....	10,412	Richmond	129,548	138,394
Breitung (Hematite)	77,574	104,757	Imperial	.....	37,542	Mitchell	.....	15,970	Rolling Mill	98,010	163,286
Cambria	132,814	169,473	Jackson	20,241	1,519	Morris	29,063	18,394	Stegmiller	40,972	45,431
Chase	19,708	52,930	Lake Angeline	128,073	104,357	Negaunee	247,484	326,877	Stephenson	93,795	96,279
Cleve. Cliffs			Lake Superior	86,957	203,964	Portland	45,324	.....	Volunteer	38,818	47,698
			Lloyd	123,211	135,746	Princeton (Swanzey)	13,607	53,476	Washington	1,659	60,581
			Lucy (McComber)	.....	2,025				Total	2,491,857	3,966,680

GOGEBIC RANGE

	1914.	1913.		1914.	1913.		1914.	1913.		1914.	1913.
Ashland	133,250	2,635	Eureka	23,430	14,562	Norrie Group	984,242	1,503,443	Sunday Lake	54,327	133,475
Asteroid	135,119	42,417	Geneva	.....	31,303	Ottawa (Odanah)	106,260	50,521	Tilden	114,767	97,373
Atlantic	.....	119,770	Ironton	51,138	166,123	Palms	174,177	88,682	Wakefield	313,050	15,261
Brotherton	47,662	70,138	Keweenaw	5,771	.....	Plumer	.....	51,053	Yale (West Colby)	19,075	89,482
Cary	68,464	217,349	Mikado	2,094	33,111	Puritan	58,410	64,463			
Castile	36,569	57,595	Montreal	229,559	219,469	Royal	11,686	10,659	Total	3,568,482	4,531,556
Colby	291,947	305,744	Newport	707,485	1,146,730						

VERMILLION RANGE

	1914.	1913.		1914.	1913.
Chandler	.....	51,403	Soudan	74,972	100,885
Pioneer	282,559	520,124	Zenith	424,110	433,603
Savoy	74,541	74,971			
Section 30	85,943	136,359			
Sibley	74,868	249,255	Total	1,016,993	1,566,600

CUYUNA RANGE

	1914.	1913.		1914.	1913.
Armour No. 1	.....	105,087	Kennedy	179,885	267,023
Armour No. 2	283,565	175,665	Pennington	.....	101,136
Barrows	47,350	9,089	Rowe	78,685	.....
Cuyuna Mille-Lacs	51,292	24,434	Thompson	178,202	47,651
Ironton	40,425	2,936	Total	859,404	733,021

MAYVILLE-BARABOO RANGES

	1914.	1913.		1914.	1913.
Iron Ridge	2,216	26,213			
Mayville	103,549	118,797	Total	105,765	145,010

	1914.	1913.
GRAND TOTAL	**32,729,726**	**49,947,116**

GRAPHIC RECORD OF SHIPMENTS BY RANGES FOR THE PAST 25 YEARS

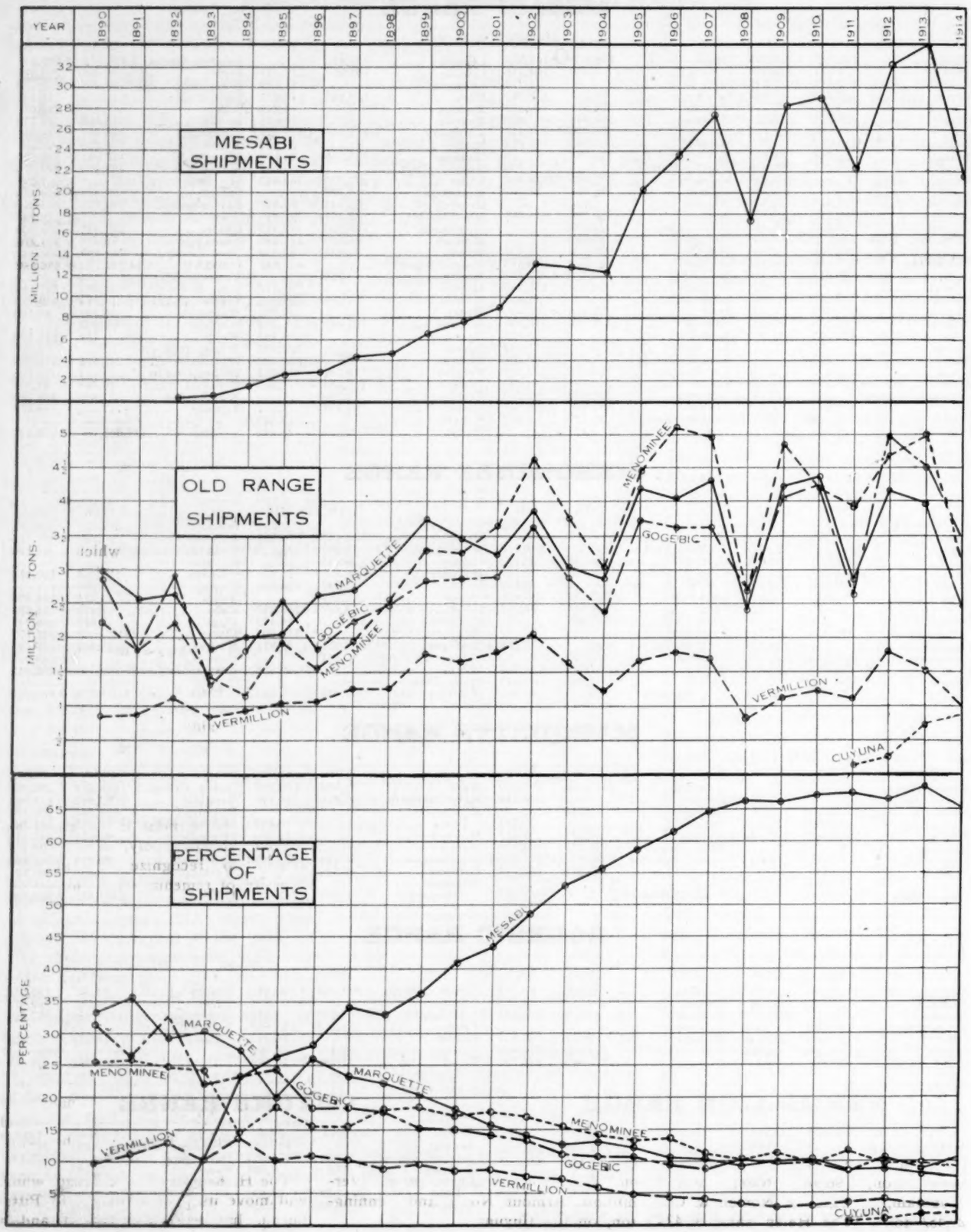


CHART SHOWING SHIPMENTS MESABI RANGE, 1892-1914; OLD RANGES, 1890-1914; PERCENTAGE OF SHIPMENTS OF ALL RANGES, 1890-1914

3,000,000 tons, only sent forward 458,468 tons in 1914. The Hull-Rust has led in shipments in six of the last eight years, the Hill being the leading producer in 1911. The Mahoning in 1914, continued its consistent record, shipping 1,212,287 tons and ranking second.

The following new mines shipped in 1914:

On the Mesabi: Deacon, Duncan, Higgins No. 1, Leonidas, Prindle, Shiras and Wanless of the Oliver Iron Mining Co.; Harrison and Quinn, of the Harrison Iron Mining Co.; Hill Annex, of the Arthur Iron Mining Co.

On the Gogebic: Keweenaw, of the Newport Mining Co.

On the Menominee: Carpenter, of the Hollister Mining Co.; Ernst, of the Florence Iron Co.; Judson, of the Judson Mining Co.; Rogers, of the Munro Iron Mining Co.

On the Cuyuna: Rowe, of the Pittsburgh Steel Co.

The 16 new shippers in 1914 compare with 20 mines opened in 1913; 13 in 1912; 12 in 1911, and 16 in 1910. Ten of the new mines shipping last year were located on the Mesabi, four on the Menominee and one each on the Gogebic and Cuyuna. Shipments from new mines in 1914 totaled 677,182 tons, compared with 831,567 tons in 1913; in 1912, 361,904 tons; in 1911, 1,769,423 tons; in 1910, 1,734,044 tons.

Two mines which have been idle for years resumed shipments in 1914, they being the Holland, on the Mesabi, idle since 1907, and the Hilltop, on the Menominee, which shipped last in 1906.

Some changes have been made in the names of mines from those previously carried. The Kellogg mine on the Mesabi has been renamed the Belgrade. The Hartley mine is now shown as the Hartley-Burt, while the Monroe and Tener mines are now carried as one mine under the name of Monroe-Tener.

Shipments from Canadian mines in 1914 were as follows: Helen, of the Lake Superior Corporation, 80,860 tons; Magpie, of the Lake Superior Corporation, 98,070 tons; Moose Mountain, of Oglebay, Norton & Co., 29,457 tons. The Helen shipped 42,550 tons in 1913; 48,838 tons in 1912; 128,628 tons in 1911, and 115,790 tons in 1910. The Moose Mountain shipped 102,238 tons in 1913; 39,061 tons in 1912; 6,678 tons in 1911, and 72,470 tons in 1910. The Magpie shipped 19,934 tons in 1913. The shipments for the Canadian mines are not included in the total for Lake Superior ore shipments.

There were 196 mines which shipped in 1914, compared with 223 in 1913, 194 in 1912, 184 in 1911, 196 in 1910 and 172 in 1909. Of those shipping last year, the Mesabi had 94, Menominee 41, Marquette 25, Gogebic 21, Cuyuna 7, Vermillion 6 and Mayville and Baraboo 2. For 1913, the Mesabi had 110, Menominee 44, Marquette 29, Gogebic 23, Cuyuna 8, Vermillion 7 and Mayville and Baraboo 2. For 1912 the Mesabi had 92, Menominee 37, Marquette 28, Gogebic 23, Vermillion 8, Cuyuna 4 and Mayville and Baraboo 2. For 1911 the Mesabi had 90, Menominee 38, Marquette 29, Gogebic 17, Vermillion 7, Cuyuna 1 and Mayville and Baraboo 2.

Of the mines which shipped in 1913, there were 54 from which no ore was forwarded last year. These were Alberta, Bray, Brunt, Crescent, Crosby, Eaton, Elizabeth, Glen, Hartley-Burt, John Jr., Knox, LaBelle, Larkin (Tesora), Longyear, Madeira, Malta, Mesabi Chief, Monroe-Tener, Morrow, Myers, Onandaga, Pearce, Pearson, Roberts, Section 17, Sellers, St. Paul, Troy, White Iron, Williams (N. Cinci.) and Yawkey, on the Mesabi; Calumet, Crystal Falls, Cundy, Fairbanks (Paint River), Great Western, Groveland, McDonald, Mansfield, Munro, Vivian and Youngs, on the Menominee; Adams (American Mining Co.), Empire, Imperial, Lucy (McComber), Milwaukee-Davis and Mitchell, on the Marquette; Atlantic, Geneva and Plumer, on the Gogebic; Chandler, on the Vermillion; Armour No. 1 and Pennington, on the Cuyuna.

The following table shows the average shipments of all of the mines on the six leading ranges and of the whole Lake Superior district for 1914 and 1913 in gross tons:

	Average mine production. 1914.	1913.
Mesabi	228,361	309,442
Vermillion	169,499	223,800
Gogebic	169,928	197,024
Marquette	99,674	136,782
Menominee	78,567	112,855
Cuyuna	122,772	91,628
Lake Superior district.	166,988	223,978

SHIPMENTS BY PORTS AND ALL-RAIL, GROSS TONS.

	1914.	1913.	1912.	1911.	1910.	1909.
Escanaba	3,664,451	5,399,444	5,234,655	4,278,445	4,959,726	5,747,801
Marquette	1,755,726	3,137,617	3,296,761	2,200,380	3,248,516	2,909,451
Ashland	3,363,419	4,338,230	4,797,101	2,429,290	4,094,374	3,834,207
Two Harbors	5,610,262	10,075,718	9,370,969	6,367,537	8,271,177	9,181,132
Superior	11,509,748	13,788,343	14,240,714	9,920,490	8,414,799	6,540,505
Duluth	6,318,291	12,331,126	10,495,577	6,934,269	13,640,166	13,470,503
Total by lake	32,021,897	49,070,478	47,435,777	32,130,411	42,628,758	41,683,599
Total by rail	707,829	876,638	785,769	662,719	813,639	903,270
Total	32,729,726	49,947,116	48,221,546	32,793,130	43,442,397	42,586,869

SHIPMENTS BY RANGES, GROSS TONS.

	1914.	1913.	1912.	1911.	1910.	1909.
Marquette	2,491,857	3,966,680	4,202,308	2,833,116	4,392,726	4,256,172
Menominee	3,221,258	4,965,604	4,711,440	3,911,174	4,237,738	4,875,385
Gogebic	3,568,482	4,531,558	5,006,266	2,603,318	4,315,314	4,088,057
Vermillion	1,016,993	1,566,600	1,844,981	1,088,930	1,203,177	1,108,215
Mesabi	21,465,967	34,038,643	32,047,409	22,093,532	29,201,760	28,176,281
Cuyuna	859,404	733,021	305,111	147,431	.....	.....
Mayville and Baraboo	105,765	145,010	104,031	115,629	91,682	82,759
Total	32,729,726	49,947,116	48,221,546	32,793,130	43,442,397	42,586,869

Public Sentiment

And Business Questions Discussed by W. H. Stackhouse

At the annual dinner of the Manufacturers' Association, at Poughkeepsie, N. Y., Feb. 27, W. H. Stackhouse, manager of the Springfield, O., plant of French & Hecht, delivered an address on the attitude of the federal government toward manufacturers as reflected in recent and pending legislation. He said that on account of the serious suffering which the industrial life of the country is experiencing, owing to the mischievous and impracticable efforts of men devoid of business experience to revolutionize the country's methods, it is absolutely necessary for business men to devote their attention seriously to governmental legislative activity. Mr. Stackhouse said:

"A comprehensive study of the commercial history of this great commercial country, compels one to conclude that unlimited competion is as ruinously harmful in its effect as unrestricted monopoly, and one is obliged to recognize the absolute necessity of remedial legislation, equitable in character and entirely free from improper discriminatory features, providing for the federal supervision of business generally and its operation under proper safeguards.

"Permit me, therefore, to suggest, for your serious consideration, the imperative necessity for business men, through such splendid organizations as yours, whether local, state or national in character, to co-ordinate their efforts toward crystallizing a sound public sentiment relative to business."

The H. Koppers Co., Chicago, which will move its general offices to Pittsburgh, has leased the ninth and a part of the tenth floors of the First-Second National Bank building, that city.

Problems of Capital and Labor

Ohio Legislators Overwhelmed by Labor Agitators—New York Law Against Alien Labor Sustained by Court of Appeals

Cleveland, March 2.—Reports from Columbus indicate that a very strong labor lobby has besieged the legislature this winter for the enactment of numerous laws for the alleged protection of working men. Philip Frankel, secretary of the Manufacturers' Association of Cleveland, returned from Columbus the other day and this is what he said:

"I just returned from Columbus this morning, where I went to look after the interests of Cleveland manufacturers, in connection with a number of labor bills that have been introduced there.

"Well I never! In my experience of 12 years past, in this work, during which period I have made no less than three scores of visits to Columbus when the legislature has been in session and during which time I have appeared before various legislative committees, I never witnessed such a large and strong labor lobby from the viewpoint of numbers and in every other way, a labor lobby of men and women, as I witnessed Wednesday night, Feb. 24. The occasion was the hearing on the 'women's eight-hour bill.'

"There was a labor lobby there from all over the state, consisting of 60 representatives and walking delegates—six from Cleveland alone, a number from Cincinnati, many from Toledo, some more from Akron, Youngstown, Piqua and Portsmouth—from all over in fact—all button-holing the legislators, haranguing for, and urging the passage of this bill before the labor committee.

"They tell me that there is a labor lobby down there every day in the week, while the legislature is in session, of 20 walking delegates. They tell me too, that about 30 to 40 labor bills have been introduced, all taking a whack at the employers of labor. Can you beat that?

"But wait! Listen to the other side of it. Guess how many employers from Cleveland appeared at this hearing on Wednesday night. ONE—the general manager of the Cuyahoga Telephone Co. The others of us from Cleveland besides this one, were there, but the other two—well—we didn't count, we were only 'paid secretaries', representing employers' associations. Think of it. Not one from Cleveland to oppose the bill in the open; but six live agitators from our town were there to fight for its passage."

Mr. Frankel believes it is high time for manufacturers to wake up and become members of associations of their lines of business, if they do not already belong, and in other ways make their influence felt at Columbus.

OHIO LEGISLATORS BESIEGED BY LABOR AGITATORS

Protested to President

Washington, March 2.—The American Federation of Labor has entered a protest against an executive order recently signed by President Wilson affecting employes of the Panama canal. Ever since the work upon the canal began, the government has furnished, free of rent, all houses, together with light, heat, etc., as well as hospital treatment for the sick and injured. It develops that recently President Wilson, acting upon recommendation from General George Goethals and Secretary of War Garrison, signed an executive order compelling employes after March 1 to pay rent for houses and to meet their own light and heat bills, as well as pay a reasonable price for hospital service.

Aliens Barred From Labor

New York, March 2.—Alien labor may not be employed in the construction of subway and elevated railroad extensions in the metropolis, according to a decision handed down by the court of appeals at Albany, which affirms the constitutionality of the state law forbidding the use of foreign-born workmen on public work. As a consequence of this decision, further delay in the award of additional contracts and in the carrying out of work now under way on the new dual rapid transit system in this city promises to result.

Quintuple Punching and Shearing Machine

A machine designed to perform punching, shearing and notching operations without the necessity of interchanging attachments has recently been developed by Joseph T. Ryerson & Son, Chicago. Its principal features are shown in the accompanying illustration and it is said that this tool will handle work for which five separate machines are employed in many cases. It is designed to work on plates, bars, angles, tees, beams and channels. The punch as well as the bar cutter and splitting shear can be operated independently by automatic clutches which may be engaged either by hand or foot.

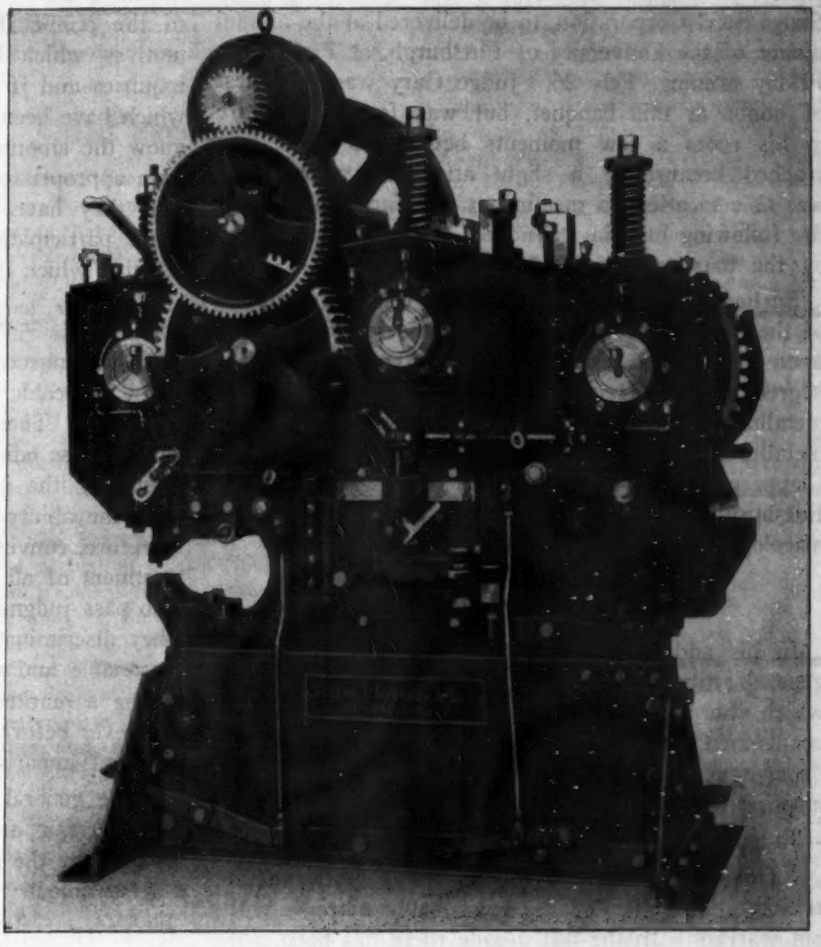
The frame of the machine consists of a solid steel offset shear body, which, it is said, permits the cutting of plates of any width or length. A hold-down, which can be adjusted vertically and horizontally is provided with the splitting shear. By means of an improved arrangement, the bar cutting device may be used to cut angles, tees, round or square bars without changing the blades. The stationary blades are mounted in a hinged frame, which facilitates their removal for grinding. By means of a special attachment, the machine may be used to cut angles in miter up to 45 degrees.

The punches are equipped with standard architectural jaws and a patented centering device. A universal hold-down provides for stripping the material punched. The sliding head of the splitting shear is provided with an extension to receive the die block for coping and notching work. It is of rectangular shape, which permits not only the standard coping of I-beams and channels, but also the notching of angles, tees, Z-bars and other material used in the construction of stairways, fire escapes, etc.

The machine is designed for either belt or motor drive; if direct electric drive is utilized, the machine is furnished with a motor bracket, gear and rawhide pinion, the motor being mounted as shown in the illustration.

The sliding heads are finished all over and are adjustable by means of bronze gibs. The plungers are counterbalanced by heavy coil springs.

This machine is designed for shops that do not have sufficient work to merit the extra expense of separate tools for several operations. It is built in four sizes. The smallest size will cut plates up to ⅜-inch and angles up to 3 x 3 x ⅜-inch; it will also punch holes up to ½-inch and cope beams up to 3 inches. The largest machine will cut plates up to 1-inch and angles up to 6 x 6 x ¾-inch; it will also punch holes up to 1¼-inch and will cope beams to 12 inches. The latter machine makes 25 strokes per minute and requires from 10 to 15 horsepower when in operation.



QUINTUPLE PUNCHING AND SHEARING MACHINE

Crane Builders Meet

The second monthly dinner and educational meeting of employes of the Cleveland Crane & Engineering Co., Wickliffe, O., was held recently. H. Weeks, safety engineer of the American Steel & Wire Co., gave an interesting talk, illustrated by stereopticon views, showing safety-first and welfare work of the Steel Corporation. Five prizes were awarded employes of the crane company for the best suggestions which can be put to practicable use in the plant, made since the last meeting. This contest will be continued for the next six months.

Record for Prompt Shipment

What is believed to be a record for prompt shipment was recently made by the Whiting Foundry Equipment Co., Harvey, Ill., on an order for a three-motor electric traveling crane of 10 tons capacity with a span of 30 feet. A telegraphic order was received at the Whiting plant on Jan. 23, calling for delivery of the crane complete on the purchaser's runway at New Bridge, Del., Feb. 10, 1915. The drawings were made and the crane was built and shipped on Jan. 29. It reached New Bridge on Feb. 4 and was erected complete ready for service on Feb. 6, four days ahead of schedule time.

Eben Hill, a prominent manufacturer of Norwalk, Conn., died at Danbury, Conn., Feb. 26, aged 65 years. He was widely known as the inventor of various mechanical appliances, including compressors for air and gas. He was a graduate of Wesleyan University.

The Milwaukee Machine Tool Co., Milwaukee, Wis., now owned and operated by the Kearney & Trecker Co., has determined to devote practically its entire attention to the production of small, high speed gasoline engines for light cars.

Judge Gary Calls Halt on Abuse

Country Injured by Agitation and Unjust Attacks

Time Near at Hand When Investigator Will Be Investigated and Committees and Commissions Will Be Brought Before the Bar for Judgment—Honored by Degree From University of Pittsburgh

INDISCRIMINATE criticism and its baneful effect from an economic as well as from a moral standpoint, were the general subject of an address prepared by Judge E. H. Gary, chairman of the United States Steel Corporation, to be delivered at the alumni dinner of the University of Pittsburgh, at Pittsburgh, Friday evening, Feb. 26. Judge Gary was the guest of honor at this banquet, but was forced to retire to his room a few moments before his name was reached because of a slight attack of grippe. He was able to attend a meeting at the Carnegie building the following morning. Judge Gary's paper was read by the toastmaster.

Earlier in the day, Judge Gary was the recipient of the honorary degree of doctor of science conferred upon him by the university. Other recipients of the degree were: Henry Marion Howe, the eminent metallurgist of New York and former professor of metallurgy in Columbia University; George Hubbard Clapp, president, the Pittsburgh Testing Laboratory, Pittsburgh, and John Jacob Abel, professor of pharmacology at Johns Hopkins University.

An Epoch of Indiscriminate Criticism

In his address, Judge Gary paid a tribute to the general attitude of editorial writers and to the press, which, he said, largely is fair and impartial. He condemned, sharply, however, the abuse, slander and demagogy which often have appeared in criticism inspired by dishonest motives.

Judge Gary's address, in part, follows:

"This is without question an epoch of indiscriminate criticism. Much is justified; probably more is without warrant. In the last decade there has been more abuse, more slander, more personal attack and more demagogy and, as a consequence, more injury to the general public, than ever before. The whole country, from an economic and a moral standpoint, has been injured greatly by agitation, investigation and attack, which were inspired by improper, if not dishonest, motives.

Investigating an Investigator

"No complaint of criticism, agitation or investigation can reasonably be made, provided the facts call for it. On the contrary, the circle of those who may be included should be and will be enlarged.

"Circumstances seem to show that we are approaching the time when the investigator will be investigated; when the criticizer will be criticized; when committees and commissions will be brought before other similar bodies for judgment. It would be interesting to the public if it could be informed of the real motives which have prompted some of the official inquiries and if it could learn of the unfair methods which have been sometimes pursued; and, if it should know the amount of governmental funds which have been appropriated for the use of the committees and how they have been disbursed; in fact, if some of those participating could be subjected to the same scrutiny which they have exercised.

Attitude of Newspapers

"But connected with the subject of criticism, there is an agreeable truth which is worthy of particular emphasis. There are at present many able, honest and fearless editorial writers who are in the habit of discussing the important questions of the day; who have the ability to write forcibly and logically; and, therefore, convincingly; who are conscientious in their treatment of all questions strictly on their merit; and who pass judgment with no thought of fear or favor. They discriminate between the good and the bad, the reasonable and the unreasonable. Those writers are having a marked influence. They are more popular than ever before for the public is quite disposed to be fair and impartial; and the number is increasing.

"The general attitude of the great newspapers of today is fair and just. They influence and are influenced by the general public. They reflect the general sentiment. This is most important.

What the Future Holds

"If the picture which I have imperfectly drawn is a true one, then the course before us, which leads to prosperity, success and happiness, is plain and we shall pursue it. We must conduct affairs in our charge with the expectation that we shall be criticized. We must square our conduct with principles we believe to be right and just to all concerned. And what is true of us who are present is just as true of all others. High position or low; power or weakness; wealth or poverty shall be no ground for immunity. From the greatest nation to the lowest subject, all are to be treated alike and judgment rendered accordingly. We must accord proper treatment to all and we shall command the same ourselves."

Money and Iron: Fact, Comment

Very Small Earnings of Locomotive Company

Effect of Business Depression Shown in Striking Manner in Report of Baldwin Works —Anxiety About Foreign Complications Has Unfavorable Effect on Stocks

How poor in earnings the year of 1914 was for the equipment companies, is set forth sharply in the annual report of the Baldwin Locomotive Works, showing net earnings of $320,609 in that period compared with $3,886,474 in 1913. This is equivalent to about 1¼ per cent earned on the preferred stock, against 20½ per cent the previous year. President Alba B. Johnson says that while the business outlook at present is more encouraging, only moderate activity may be expected during the first half.

The income account of the company for the past few years compares as follows:

	1914.	1913.
Gross sales	$13,616,163	$37,630,969
Mfg., admin. exp., depreciation, etc.	13,295,554	33,744,494
Mfg. profit	$320,609	$3,886,484
Oth. inc. (includ. div. of Stan. Steel Wks.)	661,144	787,163
Total income	$981,753	$4,673,638
Deduct int. on bonds, deposit accts, etc.	631,523	655,838
Net profit	$350,229	$4,017,800
Surp. brought forw'd.	4,887,791	2,669,990
Total undiv. profits	$5,238,021	$6,687,791
Div. on pfd. stock	1,400,000	1,400,000
Div. on com. stock	400,000	400,000
Surplus	$3,438,021	$4,887,791

Discussing the past year's operations, President Johnson says:

"During the latter part of 1913 and the first half of 1914 the falling off of railroad revenues, due to the unfavorable attitude of the interstate commerce commission, caused a general cessation of purchases of railroad equipment, and this condition was made more acute by the reduction of railroad revenues resulting from the slowing down of business due largely to the adoption of lower tariff rates. During the last half of the year 1914, these unfavorable conditions were further affected by the paralysis of finances and of business which followed the breaking out of the war in Europe. The total production of the year amounted to $13,616,163, or about one-third capacity as compared with the previous year's production of $37,630,969.

"The stress of competition forced the prices of orders secured close to the cost of production. It is obvious that under these conditions only extreme economies made it possible to carry the overhead expenses and pay interest upon the bonded indebtedness. The total earnings (including $300,000 derived from dividends of the Standard Steel Works Co.) amounted to $981,753. After payment of interest charges there remained $350,229, which was added to the previous surplus of $4,887,791, making a total of $5,238,021. The surplus remaining after payment of dividends is $3,438,021."

Gold From Canada

Lazard Freres, bankers, New York City, have announced that arrangements have been made to bring to this country $3,250,000 from the special gold reserve of the Bank of England at Ottawa, Quebec. While the purpose of the transfer has not been stated, it is believed that the gold is to be held in reserve for the Bank of France, against which bank notes possibly may be issued in France, as needed. In all, $9,300,000 in gold, has come into this country from Canada since Jan. 1. Gold also is coming in at San Francisco from the Far East. An arrival of $250,000 at the western sub-treasury the past week is for the account of the International Banking Corporation, and came from Japan. About $750,000 more is coming. Japan has been a large buyer of American cotton, raw material and war supplies, and this gold is in settlement of these transactions.

American Steel Foundries

The profits of the American Steel Foundries for the year ending Dec. 31 last as shown by the annual report just issued were, after deducting general, selling and administrative expenses, $637,503.19, as compared with $2,031,271.72 for the preceding year. After deducting $231,455.86 for depreciation, and adding miscellaneous income of $87,158.93, the earnings were $493,206.26. After deducting interest on bonds and debentures outstanding, and providing for bond redemption and debenture retirement, there is a net loss of $231,481.79. The operations for the year were at the rate of 50.4 per cent of the rated capacity of the plants, as against 80.1 per cent for the previous year. Gross sales were $11,125,091.39, as against $17,425,940.91 for 1913.

President Lamont says:

"Perhaps the most comforting statement that can be made concerning the operations of the company for the year is that after spending $913,084.70 for repairs and maintenance, charging $231,455.86 to depreciation, and paying out $343,680 in dividends, we ended up the year with net assets practically the same as they were at the beginning, the actual decrease being less than $8,000. The balance sheet will show, however, a decrease in surplus of $575,161.79, and while $567,263.14 of this is offset by a reduction in our bond and debenture indebtedness, or provision therefor, the fact remains that our surplus has been reduced from $1,243,149.10 to $667,987.31, and this is the figure that must be kept in mind.

"At the close of a report to the directors a year ago, the president made the following statement as to the year then just opening up and now just closed:

> " 'The present year opens up very badly. Our plants are running at half capacity or less. The small amount of work that is being let is going at low prices, and there is as yet no general buying on the part of the railroads either for new equipment or for repairs. Even under the most favorable conditions, we are bound to show losses for several months.'

"The actual results up to the middle of the year were almost exactly what had been expected. The earnings for the first few months were small, but by August we were running at a rate, which, if it could have been maintained, would have shown a profit sufficient to take care of all charges and pay the dividend, in spite of the very bad beginning. However, the August showing was on tonnage accumulated before the outbreak of the European war. From that point we, in common with most industries, went steadily down and the end of the year was worse than the beginning.

"Of course the most important event bearing on our business in a general way was the decision of the interstate commerce commission in the

eastern rate case. We may not get any immediate benefit, for as long as certain unfavorable conditions at home and the war abroad continue as the principal controlling elements in the gentral business situation, we cannot expect the rate decision alone to bring us much new business; but it is vitally helpful and we will get the benefit of it when the other conditions become satisfactory.

"It is difficult to say much as to the present year; one guess is as good as another. We are showing small gains in tonnage at some of the plants and there is more business in prospect now than there has been at any time since the outbreak of the war, but actual orders materialize very slowly. If the crop situation develops favorably, we may be operating on a satisfactory basis during the second six months of the year."

Industrial Stocks

Despite proof of increase in production of iron and steel and other products, the predominating influence of the week—apprehension that serious results may follow on account of the attitude of Germany toward the shipping of other countries—has been depressing and most of the stocks on the New York exchange scored losses. Toward the latter part of the week, the feeling of uneasiness became less marked and a more hopeful sentiment prevailed. Gains and losses of the leading industrial stocks are shown in the following table:

American Brake Shoe & Fdy. Co.	—3¾
Amer. Brake Shoe & Fdy. Co., pfd.	—3⅝
American Can	— ⅞
American Can, prfd.	...
American Car & Fdy. Co.	—1¾
American Car & Fdy. Co., prfd.	—1⅜
American Locomotive	— ¾
American Steel Foundries	— ⅞
Baldwin Locomotive Co.	—2½
Baldwin Locomotive Co., prfd.	—1
Bethlehem Steel	—1
Bethlehem Steel, preferred	—1½
Colorado Fuel & Iron	+ ⅛
Continental Can	—2
Continental Can, prfd.	—1½
General Electric Co.	— ¼
International Harv. of N. J.	—1½
International Harv. Corporation	+1
National Enameling & Stamping	— ⅛
Pressed Steel Car	— ½
Pressed Steel Car, prfd.	—3
Pullman Palace Car	—1½
Republic Iron & Steel	—1
Republic Iron & Steel, prfd.	—1⅝
U. S. Cast Iron Pipe & Fdy.	+ ⅛
U. S. Cast Iron Pipe & Fdy., prfd.	—1⅜
United States Steel	+ ½
United States Steel, prfd.	— ¼
Westinghouse Mfg.	— ⅝

Creditors Accept Plan

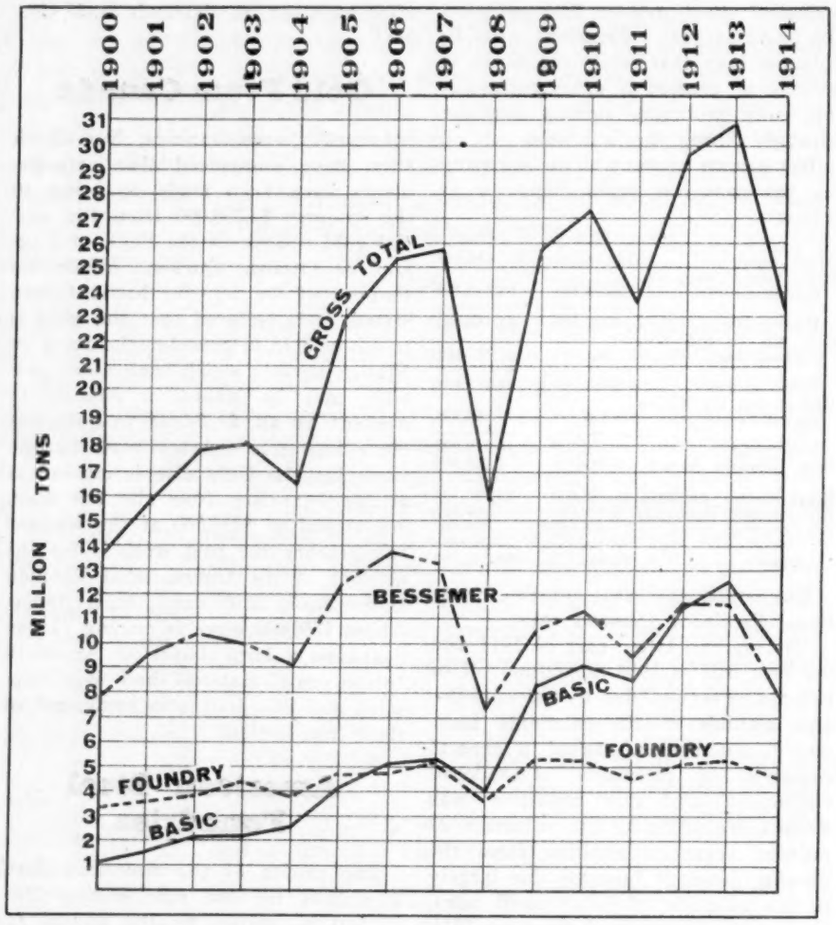
J. B. Orr, an attorney of Pittsburgh, has sent out letters to all creditors of the Alton Steel Co., as the representative of H. C. Fones, offering to pay them 40 cents on the dollar on their claims. Mr. Fones is one of the largest bondholders of the company.

The plan is said to have been worked out by Mr. Fones and other bondholders, and the letter states that all creditors to whom the proposition has been submitted have agreed to accept, including the Joseph Joseph & Bros. Co., whose claims amount to $70,000. The plant was placed in the hands of a receiver in July, 1914, and has not been operated since.

The plant is subject to a first mortgage of $300,000 and a second mortgage of $350,000, both of which now are in default.

Allis-Chalmers Deficit

Total sales billed by the Allis-Chalmers Mfg. Co., Milwaukee, for the year ended Dec. 31, 1914, were $10,323,149, according to a preliminary report just issued by the company. This compares with $11,127,621 for 1913. There was a deficit in the net earnings of the company for 1914 amounting to $78,971, which compares with a net profit of $755,125 for the preceding year. At the close of last year the company's unfilled orders aggregated $2,400,663, which is about $1,000,000 less than at the close of 1913. The company is the reorganized Allis-Chalmers Co., heavy machinery manufacturer. It has $16,500,000 cumulative 5 per cent preferred and $26,000,000 common shares outstanding. The annual meeting will be held May 6.



PRODUCTION OF LEADING GRADES OF PIG IRON, 1900 TO 1914, AS SHOWN BY STATISTICS OF AMERICAN IRON AND STEEL INSTITUTE.

Financial Notes

The committee of stockholders which has been working on plans to reorganize the Barney & Smith Car Co., Dayton, O., has asked for the deposit of shares with the Central Trust & Safe Deposit Co., Dayton, on or before March 30. The plan to lift the receivership will be announced after April 1 and will be submitted to the stockholders for their approval.

Reorganization of the Sparta Mfg. Co., Sparta, Mich., has been effected, the company being reincorporated with $100,000 capital stock, half of which is to be issued soon. A holding company with $500,000 capital stock will be organized to handle the company's entire output.

The Century Iron Works, Inc., 629 Concord avenue, New York City, has filed schedules in its bankruptcy petition showing liabilities $24,245 and assets $8,801.

Production of Pig Iron Last Year

Statistics Compiled by the American Iron and Steel Institute Show Loss of Nearly 25 Per Cent Compared With 1913

PRODUCTION OF PIG IRON BY STATES, 1913–1914.

States.	Production—Gross tons. 1914.	Per cent.	1913.	Per cent.	Decrease.	Per cent.
Pennsylvania	9,733,369	41.72	12,954,936	41.84	3,221,567	24.87
Ohio	5,283,426	22.64	7,129,525	23.02	1,846,099	25.89
Illinois	1,847,451	7.92	2,927,832	9.45	1,080,381	36.90
Alabama	1,826,929	7.83	2,057,911	6.65	230,982	11.22
New York, N. J.	1,559,864	6.69	2,187,620	7.06	627,756	28.70
Ind., Mich.	1,557,355	6.67	1,775,883	5.73	218,528	12.31
Wis., Minn.	329,526	1.41	367,326	1.19	37,800	10.29
Virginia	271,228	1.16	341,815	1.10	70,587	20.65
Mo., Col., Cal.	267,777	1.15	324,263	1.05	56,486	17.42
W.Va.,Ky.,Miss.	236,393	1.01	315,731	1.02	79,338	25.13
Tennessee	216,738	.93	280,541	.91	67,803	22.74
Maryland	195,594	.84	289,959	.94	94,365	32.54
Conn., Mass	6,594	.03	12,810	.04	6,216	48.52
Total	23,332,244	100.00	30,966,152	100.00	7,633,908	24.65

PRODUCTION OF COLD AND WARM BLAST CHARCOAL PIG IRON.

Kinds of iron.	1910.	1911.	1912.	1913.	1914.
Cold blast	10,276	10,930	8,864	10,222	9,294
Hot and warm blast*	386,231	267,746	338,161	329,759	254,630
Total.....Gross tons.	396,507	278,676	347,025	339,981	263,924

* Includes iron made with charcoal and electricity

PRODUCTION OF PIG IRON BY GRADES, 1900–1914.

Years.	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
1900	1,072,376	7,979,327	3,376,445	173,413	793,092	394,589	13,789,242
1901	1,448,850	9,596,793	3,548,718	256,532	639,454	388,007	15,878,354
1902	2,038,590	10,393,168	3,851,276	311,458	833,093	393,722	17,821,307
1903	2,040,726	9,989,908	4,409,023	473,781	783,016	312,798	18,009,252
1904	2,483,104	9,098,659	3,827,229	263,529	550,836	273,676	16,497,033
1905	4,105,179	12,407,116	4,758,038	635,236	727,817	358,994	22,992,380
1906	5,018,674	13,840,518	4,773,011	699,701	597,420	377,867	25,307,191
1907	5,375,219	13,231,620	5,151,209	920,290	683,167	419,856	25,781,361
1908	4,010,144	7,216,976	3,637,622	414,957	457,164	199,155	15,936,018
1909	8,250,225	10,557,370	5,322,415	658,048	725,624	281,789	25,795,471
1910	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244

PIG IRON MADE FOR SALE BY GRADES IN 1914.

States.	Bessemer	Basic.	Forge.	Foundry.	Malleable.	All other.	Total. Gross tons.
Mass., Conn.				5,494			5,494
N. Y., N. J., Md.	56,115	162,104	10,163	676,296	205,479	2,132	1,112,289
Pennsylvania	384,623	432,720	106,522	715,134	57,518	56,281	1,752,798
Va., W. Va., Ala.		138,800	42,319	1,407,305		19,613	1,608,037
Ky., Tenn., Miss.	33,021		3,186	246,901	7,915	8,964	299,987
Ohio	33,874	519,296	33,868	610,494	167,904	1,027	1,366,463
Indiana, Illinois	20,272	175,954		169,739	138,473	3,392	507,830
Mich.,Wis.,Minn., Mo., Cal.		50,847		561,726	94,482	3,027	710,082
Total	527,905	1,479,721	196,058	4,393,089	671,771	94,436	7,362,980

HALF-YEARLY PRODUCTION OF PIG IRON BY STATES IN 1914.

States.	Blast furnaces. In blast June 30, 1914.	December 31, 1914. In.	Ont.	Total.	Production—Gross tons. (Includes spiegeleisen, ferro-mang., ferro-silicon, ferro-phosphorus, etc.) First half of 1914.	Second half of 1914.	Total for 1914.
Massachusetts	0	1	1	2	4,292	2,302	6,594
Connecticut	1	1	2	3			
New York	13	12	15	27	818,425	741,439	1,559,864
New Jersey	2	1	5	6			
Pennsylvania	76	63	96	159	5,207,051	4,526,318	9,733,369
Maryland	2	2	3	5	101,605	93,989	195,594
Virginia	8	3	19	22	164,796	106,432	271,228
Georgia	0	0	4	4			
Texas	0	0	3	3			
Alabama	20	18	30	48	902,186	924,743	1,826,929
West Virginia	1	1	3	4			
Kentucky	1	1	5	6	136,742	99,651	236,393
Mississippi	0	0	1	1			
Tennessee	6	4	14	18	113,137	103,601	216,738
Ohio	43	31	43	74	2,865,367	2,418,059	5,283,426
Illinois	12	7	19	26	1,045,905	801,546	1,847,451
Indiana	8	4	6	10			
Michigan	8	9	5	14	851,700	705,655	1,557,355
Wisconsin	3	3	5	8			
Minnesota	1	0	1	1	195,991	133,535	329,526
Missouri	1	1	1	2			
Colorado	2	2	4	6			
Oregon	0	0	1	1	128,897	138,880	267,777
Washington	0	0	1	1			
California	0	0	0	0			
Total	208	164	287	451	12,536,094	10,796,150	23,332,244

PRODUCTION OF PIG IRON BY GRADES, 1913–1914, SHOWING INCREASE OR DECREASE BY GRADES.

Grades.	1914.	Per cent.	1913.	Per cent.	Decrease.	Per cent.
Basic	9,670,687	41.45	12,536,693	40.48	2,866,006	22.86
Bessemer	7,859,127	33.68	11,590,113	37.43	3,730,986	32.19
Foundry	4,533,254	19.43	5,220,343	16.86	687,089	13.16
Malleable	671,771	2.88	993,736	3.21	321,965	32.40
Forge	361,651	1.55	324,407	1.05	* 37,244	* 11.48
Spiegeleisen	79,935	.34	110,338	0.36	30,403	27.55
Ferro-manganese	106,083	.46	119,495	0.38	13,412	11.22
All other	49,736	.21	71,027	0.23	21,291	29.98
Total	23,332,244	100.00	30,966,152	100.00	7,633,908	24.65

* Increase.

METHODS BY WHICH ALL PIG IRON WAS CAST OR DELIVERED.

States.	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total. Gross tons.
Mass., Conn.		6,594				6,594
N. Y., N. J., Md.	557,501	777,563	293,541	126,244	609	1,755,458
Pennsylvania	5,730,713	1,115,829	2,568,019	315,025	3,783	9,733,369
Va., W. Va., Ala.	449,523	1,423,011	280,629	80,228	2,781	2,236,172
Ky. and Miss		98,378				98,378
Tennessee		208,122		8,616		216,738
Ohio	2,807,761	655,795	1,606,869	207,905	5,096	5,283,426
Ind., Ill., Mich. Col.	2,365,749	249,427	1,036,773		1,079	3,653,028
Wis., Minn.,Mo.,Cal.		280,240	68,830		11	349,081
Total	11,911,247	4,814,959	5,854,661	738,018	13,359	23,332,244

In the tables above, pig iron made with bituminous coal is classified as coke pig iron. Pig iron made with mixed anthracite and coke is included in anthracite pig iron. Pig iron made with coke and electricity is included in coke pig iron. Pig iron made with charcoal and electricity is included in charcoal pig iron. Low phosphorus pig iron running under 0.04 in phosphorus is included in bessemer pig iron. Pig iron containing from 0.04 to 0.10 per cent of phosphorus is classified as bessemer. Nearly all of the charcoal iron is classed as foundry pig iron. Ferro-silicon is included in foundry pig iron. Pig iron containing 7 per cent or over of silicon is classified as ferro-silicon. "All other grades" include white and mottled iron, direct castings and miscellaneous ferro-alloys.

Germans Have Maps of Mines

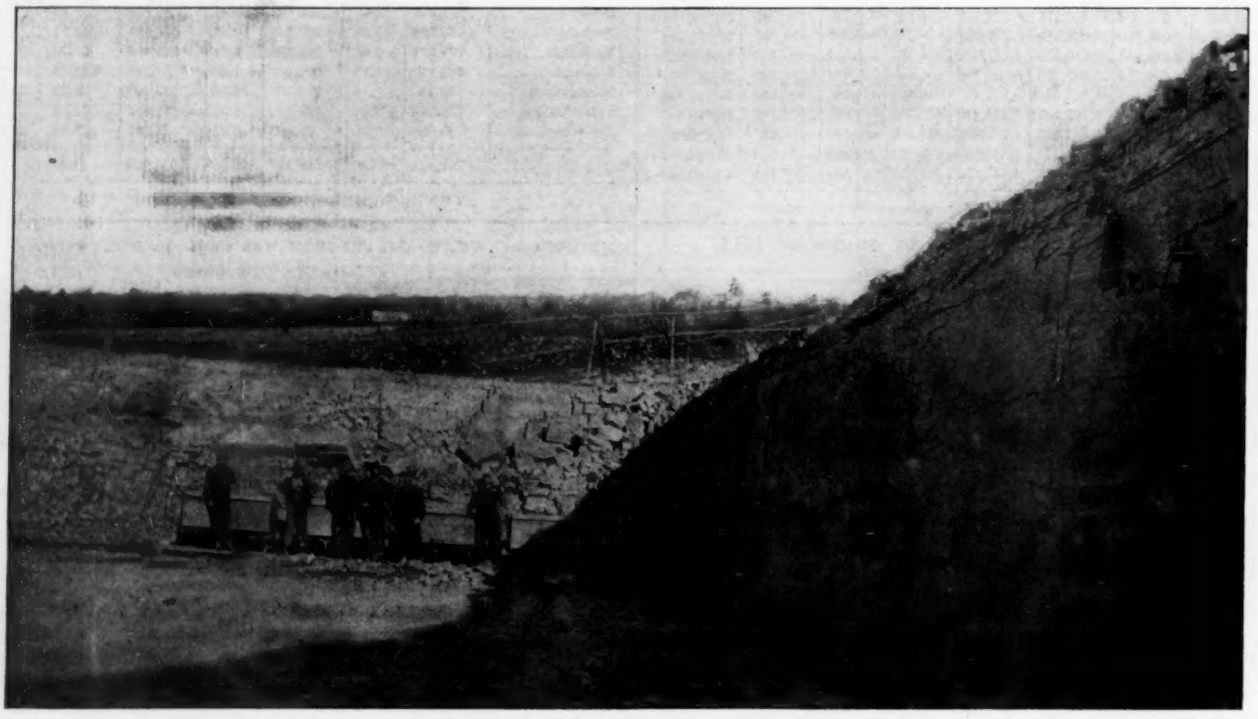
Covet Valuable Deposits in Newfoundland

Big Guns Now Being Used Against the Allies Made From Ore Shipped From England's Oldest Colony—Interesting Discoveries Made by an Official of a Steel Company

BY P B McDONALD

THERE is a rocky little island, approximately six miles by two, which lies off the storm-beaten coast of Newfoundland, and which contains two great iron mines that produce a well-known, well-liked blocky iron ore. This lonesome, barren bit of rock is Bell island, and the two mines are those of the Nova Scotia Steel & Coal Co. and the Dominion Iron & Steel Co., both with blast furnaces at Sydney, Nova Scotia.

In connection with the present European war, it is noteworthy that the Nova Scotia company, for some time previous to the war, had been furnishing iron ore to the Krupps through Rotterdam, and much of the armament and guns now being used against British soldiers is made from British iron ore from England's oldest colony, Newfoundland. On one occasion, several years ago, an official of the Nova Scotia company was at Essen, Germany, on business in regard to ore contracts, and found the Krupp people very much interested in the physical condition of the Wabana iron mines, as the Bell island mines are called. But what is more, he found the astute Germans very well informed concerning every detail of the underground workings, submarine areas, ore reserves, costs, etc., and he was amazed when they took him into an inner room, during the discussion, and showed him first class maps of his own mines. When he asked in some surprise where they obtained all this information, they merely smiled and said, "From various sources," explaining that they had long been interested in these mines situated so conveniently for shipping to Germany. There is little doubt that German interests covet these north Atlantic iron ore mines, with their fine blocky ore, so well-liked for furnace mixing, and with an assured supply of hundreds of millions of tons. Not the least to the mines' advantage is their splendid location on tidewater, or rather *under* tidewater (for many of the workings are thousands of feet out under the sea), from which shipments have been made equally well to Philadelphia, Sydney, Middlesboro, England, Rotterdam, and, in fact, to half the civilized world. During the shipping season of 1909, the Nova Scotia company loaded nearly a hundred steamers for various ports. The ore is hoisted up the long incline slopes from under the sea (the several ore seams dip at about 8 degrees),



BELL ISLAND IRON MINE, SHOWING SEAM OF IRON ORE WHICH DIPS UNDER THE SEA

is transported two miles across the island by cable-operated tramways to the excellent ore-loading piers on deep water (constructed in natural gullies in the high rock shore), and steamers are loaded in quick time. The equipment and conditions at these mines are first-class; there are electric steam shovels underground (the seams vary up to 30 feet in thickness); the machinery is specially designed for handling large quantities; and labor is plentiful and at the same time fairly competent.

New Mesta Gas Engines for Steelton

WHAT is said to be the largest single tandem gas blowing engine ever constructed in the United States was on exhibition at the works of the Mesta Machine Co., West Homestead, Pa., Feb. 12, 13 and 15. The accompanying illustration shows the engine on the erecting floor of the Mesta company. The air end of the engine is equipped with Mesta automatic plate valves of the Iversen type, which require no valve gearing. The use of these valves has made possible the placing of the air cylinder back of the gas cylinders so that the air cylinder piston can be driven directly through an extension of the gas cylinder piston rod. This arrangement is simple and is said to have advantages over placing the air cylinder on the opposite end of the bed. The gas cylinders are 46 inches and the air cylinders 84 inches in diameter with a common stroke of 60 inches. The engines will be run at a speed of from 45 to 85 revolutions per minute depending on operating conditions.

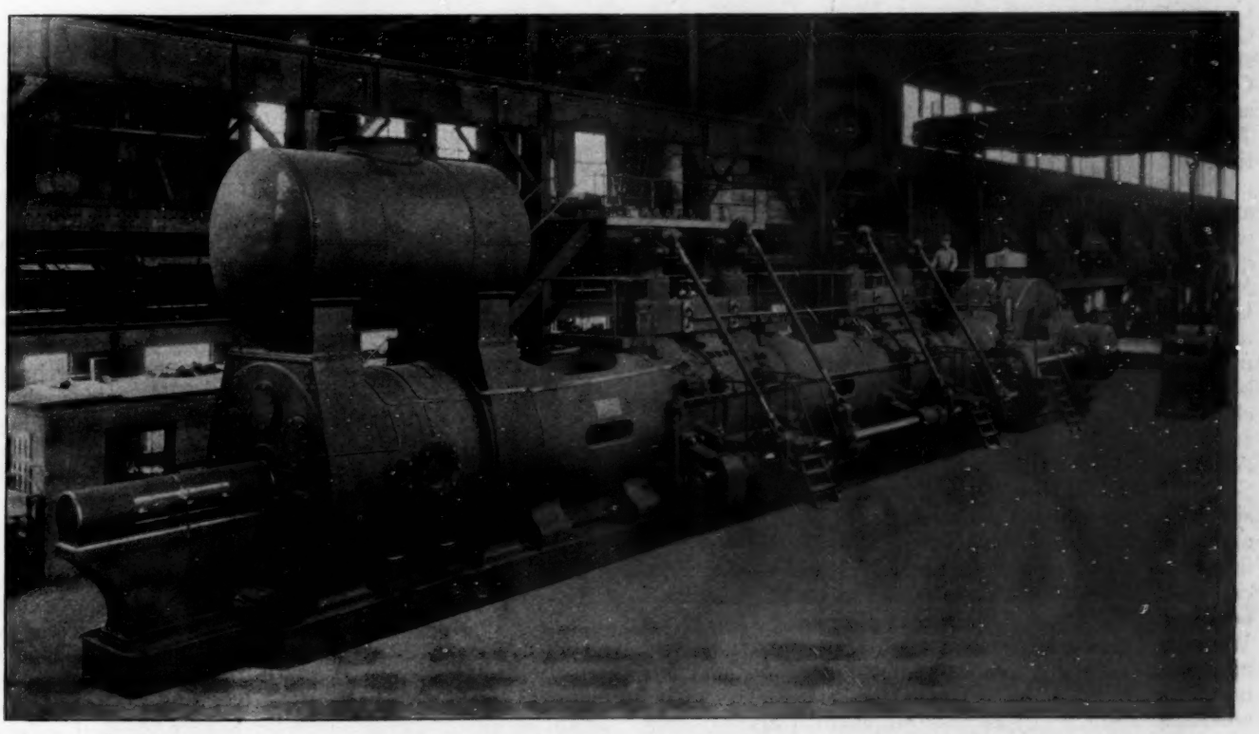
The engine is equipped with a center crank to permit the use of a double bearing bed plate and to give a more equal distribution of the stresses. A duplicate unit is going through the Mesta shops at the present time. A comprehensive description of the engines will be published when they are placed in operation at the plant of the Pennsylvania Steel Co., Steelton, Pa.

More Stacks Going In

Eastern blast furnace operations are increasing slightly. Two merchant and two non-merchant plants are about to go in. The No. 1 Hokendauqua, Pa., furnace of the Thomas Iron Co. has been ordered in and will be started about March 6. The Brown top device of this furnace has been remodeled and repairs have been made to the boilers, cast house, etc. The repairs and improvements to the No. 3 Hokendauqua furnace have not been completed but the two stove linings are about ready. With No. 1 Hokendauqua in blast, the Thomas company will have three furnaces active, as the Lock Ridge furnaces, Nos. 7 and 8 at Alburtis, Pa., continue in operation and are running on anthracite coal and coke. The No. 1 Hokendauqua will run on all coke.

The Everett furnace of Joseph E. Thropp at Earlston, Pa., as noted previously, also is going in. Among the non-merchant furnaces, the Alan Wood Iron & Steel Co. is starting one of its Swedeland, Pa., units and the Maryland Steel Co. is putting on an additional furnace at Sparrows Point, which is in connection with the resumption of the rail mill and the bessemer open hearth steel works.

The Prime Steel Co., Milwaukee, has booked one of the largest single orders for crucible steel castings known to the plant, for the Four Wheel Drive Automobile Co., Clintonville, Wis., which has recently received orders for 130 army trucks. The Prime company's order is for parts for nearly 350 vehicles and covers requirements for the first half of 1915. The destination of the army trucks is not divulged, but a greater part is believed to be on foreign account.



THREE QUARTER REAR VIEW OF NEW MESTA GAS ENGINE FOR PENNSYLVANIA STEEL CO.

Railroad Buying is Encouraging

Abnormal Demand at Pittsburgh Due to War—Chicago Machinery Market Shows Signs of Life—Cincinnati District Rushed

SEVERAL leading eastern machine tool houses report that their sales are eclipsing all previous high marks in their history. A large amount of business has been entered on the books and a large quantity still is pending. The chief feature is the development of buying by the railroads. While the business coming from these interests is not large in the aggregate, it is satisfactory to machinery sellers, as reflecting a somewhat more liberal disposition on the part of the roads. The Santa Fe has ordered some miscellaneous equipment; the Erie railroad has purchased a punching machine and is expected shortly to close for additional equipment; the Philadelphia & Reading railroad has purchased three punching machines and some other equipment; the Central Railroad of Vermont has placed a 90-inch driving wheel lathe, a radial drill and some other equipment; the Atlantic Coast line has closed for several machines, including a steam hammer, radial drill, accumulator, multiple drill, sectional hydraulic flanging press and several punches and shears; the Delaware, Lackawanna & Western is inquiring for a vertical milling machine and a 36-inch lathe.

War orders continue to furnish the bulk of the current machinery business. A large amount of new business for direct export is being entered. This involves principally lathes, a considerable number of small vertical milling machines and other machinery, mostly for shipment to Russia and considerable for England. In addition, there is a fair demand from neutral countries. It continues rather difficult to make export shipments in view of the situation in ocean traffic. One of the most interesting developments is a contract reported to have been let to the Crucible Steel Co. of America by J. P. Morgan & Co. This involves $150,000,000 worth of shells for shipment to England. The Westinghouse Air Brake Co. is expected to close without delay on a large amount of equipment for use in making shrapnel. The New York Air Brake Co., which for a long time has been figuring on a large shrapnel contract, is reported to have booked a portion of this contract, and is figuring on considerable machinery. The Baldwin Locomotive Works is figuring on a considerable quantity of equipment. The Traylor Engineering & Mfg. Co., Allentown, Pa., which recently bought a large amount of machinery for use in making shrapnel, is expected to buy a large quantity of additional machinery in the course of a month, providing it books another contract on which it is figuring. Machinery sellers continue to report an improved demand from manufacturers who have not booked war orders. Among good-sized buyers have been the Elevator Supply & Repair Co., New York, which bought some six machine tools for a new plant in Hoboken, N. J., and the Visayan Oil Co., New York, which bought five or six tools. The Orange, N. J., board of education has begun to place orders for vocational school equipment, for which it recently inquired. Pratt & Whitney Co., Hartford, Conn., has purchased a large additional amount of machinery and still is in the market for good-sized requirements. The Consolidated Electric Light & Equipment Co., Bayonne, N. J., is reported to be revising the large preliminary list of machine tools, which it had put out some time ago.

Pittsburgh Profits from Fighting

THE MACHINERY market at Pittsburgh continues to be featured by an abnormal demand for equipment for the manufacture of war material. The Westinghouse Air Brake Co., which has made reservations for about $500,000 worth of tools, has opened negotiations for a dozen grinders, and other interests are quietly figuring in the market for turret lathes, grinders, etc. An inquiry for 50,000 howitzer shells for Russia has aroused considerable interest among concerns able to meet specifications, and the purchase of considerable machinery will result if the order is placed in the Pittsburgh district.

Activity is not confined to lines directly affected by the war, although the domestic situation is not yet normal. The Alloy Steel Forging Co., which has been figuring in the market for some time, has just closed for a guillotine shear and is now asking prices on a set of straightening rolls and a set of bending rolls. The Rahe Co., on the south side, has concluded negotiations for a punch. Samuel Diescher & Sons, Farmers Bank building, have been engaged to build 20 additional tin plate mills for the McKeesport Tin Plate Co., which means the purchase of mills and auxiliary equipment. Julian Kennedy is asking bids on a 30-inch two-high blooming mill and a 28-inch bar mill, with necessary equipment, for the Youngstown Iron & Steel Co. The Mesta Machine Co. has completed a large blowing engine for the Pennsylvania Steel Co.

Chicago is Waking Up

MORE indications are apparent in and about Chicago that the machine tool trade is improving. While not all dealers are experiencing the increase and some find a slow falling off from the latter part of January, the trade in general is in much better condition. One dealer reports that builders of tractors are buying liberally of shop equipment and another finds turret lathes and milling machines moving much better than formerly. An order for 50 lathes is on the point of being closed and probably will be landed by a maker located near this city. One dealer finds the demand for used machinery is increasing materially and is shipping a number of machines of this class. One indirect result of export demand is the purchase by Cincinnati tool makers of machinery which they have not time to build for their own use in producing goods for export. While the domestic demand for machine tools is slightly in excess of that experienced recently, the greater portion of the increased activity is either directly or indirectly traceable to European orders.

Machine tool builders in cities adjacent to Chicago have increased their forces and some are working overtime in order to catch up with their orders. A recent purchase of several heavy tools was almost lost because no maker could be discovered who would guarantee delivery before April 15. This condition as to prompt delivery seems to be general and sellers who depend on domestic demand feel themselves

Splendid Results Insure Further Additions

The illustration below shows an installation of **Ayer & Lord Interior Wood Blocks** in the Truck Shop of the **Detroit United Railway Co., Detroit, Mich.**

In the background to the left, notice the large number of heavy wheels stored away on their sharp flanges. In the foreground are shown some of these wheels mounted on heavy axles. Complete trucks bearing huge motors are also assembled and moved about on this floor.

Surely this is an extremely severe test for any kind of a factory floor, yet it is giving such satisfaction that the owners are going to make additional installations before long.

Ayer & Lord Tie Company

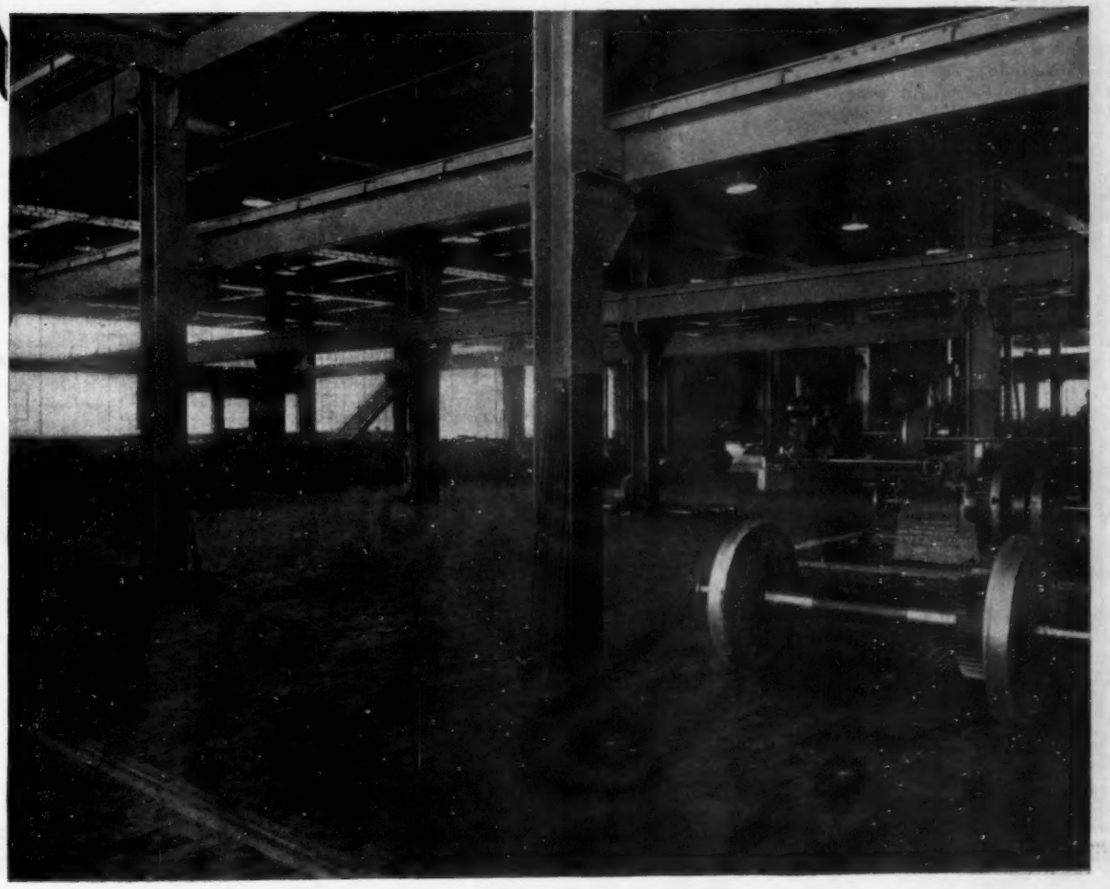
General Office, Railway Exchange, Chicago

CLEVELAND, O.—801 Swetland Bldg.
KANSAS CITY, MO.—1117 Rialto Bldg.
MEMPHIS, TENN.—1402 Exchange Bldg.
PHILADELPHIA, PA.—319 Perry Bldg.

THIS IS NOT A TESTIMONIAL—IT'S AN ANSWER TO AN INQUIRY!

"Referring to your letter of Dec. 17th, we have creosote wood block flooring in two of our machine shops where the heavy trucking is done, and it is giving very good satisfaction. The flooring was furnished by the **Ayer & Lord Tie Co., Chicago, Ill.**, and if you will get in touch with them, they will give you full information on the subject."

Write at once for our little booklet "Floors"



Say you saw it in THE IRON TRADE REVIEW

rather pinched by conditions, in that they cannot make prompt delivery of the few orders that they are able to obtain, unless the machines are already built and on their warehouse floor.

Cincinnati Needs Skilled Men

IN CINCINNATI manufacturers of lathes continue to run at full capacity, and the majority have sufficient orders on hand to cover the next two or three months. A peculiar condition, which is in striking contrast with the situation a year ago, has developed in that some shops here are unable to secure all the help that is needed, both skilled and unskilled. Several companies, as for instance the R. K. Le Blond Machine Tool Co., have sent out representatives to scour the country in an effort to induce workmen from other cities to come to Cincinnati. Work being done by most of the larger lathe-makers, such as the Lodge & Shipley Machine Tool Co., the American Tool Works Co., the Cincinnati Iron & Steel Co., the R. K. Le Blond Machine Tool Co. and the Greaves-Klusman Tool Co., is for delivery to European countries engaged in the war.

Domestic orders are increasing and several shops are busy on these alone. The Modern Machine Tool Co., which went into receiver's hands recently, is now running full time on orders received from users in the United States, and domestic business also increased considerably with the Cincinnati Iron & Steel Co. during the past month. Makers of shapers are a little busier, but this tool has been selling only in scattered lots. Sales of planers are only fair, and are about equally distributed between domestic and foreign sources. Considerable foreign business for immediate delivery of lathes is still pending, but only a few new orders are being booked because the shops are unable to get out the orders already on hand.

EASTERN STATES

SUNAPEE, N. H.—Globe Wrench Co. has been incorporated; $20,000 capital stock; by M. F. Knowlton, E. P. Bartlett, W. F. Galucia and L. L. Knowlton.

JEFFERSONVILLE, VT.—L. S. Morse's steam mill suffered about $10,000 loss by fire; plant will be rebuilt in the spring.

BOSTON.—Architect S. E. Tobey, 164 Federal street, has received bids on a 1-story, 50 x 180-foot factory, to be erected for the Sturtevant Mill Co.

BOSTON.—George F. Watts Corporation, contractor, has received its charter; $10,000 capital stock; by George F. Watts, Charles D. Irwin and Zula S. Doane.

BOSTON.—Bay State Brass Rail Co. has been incorporated; $10,000 capital stock; by John F. Williams, George A. MacDonald, James P. Clare, George F. Spearin and Louis Wernicke.

BRAINTREE, MASS.—Plant of Dow Mfg. Co., manufacturers of electrical equipment for automobiles, was damaged by fire.

LENOX, MASS.—Bids probably will be received this month for the construction of a water works, to cost about $30,000; A. B. Farnham, Pittsfield, Mass., engineer.

LOWELL, MASS. — Lockwood, Greene & Co., engineers, Boston, have let contract for 1-story, 90 x 450-foot addition to plant of United States Cartridge Co., Lowell; the latter company has been a liberal buyer of machine tools the last few months and still is in the market.

WORCESTER, MASS.—Universal Appliance Co. has been incorporated to manufacture adjustable brackets and machines; $200,000 capital stock; by Phillip C. Stingel, Stoneham, Mass.; Owen Goldsmith, Brookline, Mass., and James V. Howard, Melrose, Mass.

WORCESTER, MASS.—John Bath of the Bath Grinder Co., Fitchburg, and Matthew G. Fitzpatrick, many years superintendent of Boynton & Plummer, Inc., machinists, Worcester, have leased half of the third floor in the new Osgood-Bradley industrial building and intend shortly to begin manufacturing machine tools. Mr. Fitzpatrick has purchased the business of Boynton & Plummer, Inc., and it is said this will be combined with Mr. Bath's interests and a new company will be formed.

HARTFORD, CONN. — Pratt & Whitney Co. has purchased some additional machine tools for its new plant and still is in the market for a large quantity of miscellaneous equipment.

LITCHFIELD, CONN.—Anti-Friction Co. plans to start work early in the spring on a fireproof factory addition.

BRONX, N. Y. — Universal Ornamental Iron & Steel Co., contractor, iron, steel structures, has been incorporated; $10,000 capital stock; by A. Lechtman, A. and B. Chaikovsky, 2166 Third avenue.

BROOKLYN.—Boorum & Pease Co., Hudson avenue, large wholesale stationer, has let contract for a 5-story addition.

BROOKLYN. — O'Brien-Ott Hydrant Syphon Co., mechanically constructed appliances, has been incorporated; $5,000 capital stock; by William J. O'Brien, John Ott and Charles Tilley, 1575 Bergen street.

BROOKLYN.—Board of education, C. B. J. Snyder, superintendent of school buildings, has received bids for a vocational school to be erected at Nassau and Jay streets, Brooklyn.

BROOKLYN. — Wm. Beckers Aniline & Chemical Works, 105-113 Underhill avenue, has purchased 15 acres near Jamaica Bay and will begin work at once, on a large power plant and 22 other buildings, which will constitute the new plant of the company; the present plant was damaged badly by an explosion last November.

HORNELL, N. Y.—Erie railroad has purchased a punching machine for its shops here and it is understood some additional machinery will be ordered.

JAMESTOWN, N. Y. — Aristo Regulator Co., machinery, mechanical appliances, etc., has been incorporated; $35,000 capital stock; by Gerald M. Pambleton, N. A. Johnson and Frank E. Clark, 311 Prendergast avenue, Jamestown.

LOCKPORT, N. Y.—Harrison Mfg. Co., manufacturer of automobile radiators, will build a $15,000 addition; Jas. R. Tyler, 714 Insurance building, Rochester, is the architect.

NEW YORK. — Delaware, Lackawanna & Western railroad has inquired for a vertical milling machine and a 36-inch lathe.

NEW YORK.—New York Air Brake Co. is understood to have booked a shrapnel contract and is figuring on some equipment.

NEW YORK.—Diamond Machine Co., 38 Vesey, has increased its capital stock from $150,000 to $515,000.

NEW YORK.—Robbins Dry Dock & Repair Co., 15 Whitehall street, is taking bids on 1-story, 80 x 200-foot machine shop, to be built at Erie basin, Brooklyn.

NEW YORK.—Bethlehem Lamp Mfg. Co. has been incorporated; $10,000 capital stock; by H. and D. Freiberger and S. Wiesenberger, South Bethlehem, Pa.

NEW YORK.—Mayer & Lavenson Co., 503-507 East Seventy-second street, manufacturer of metal signs, suffered considerable damage by fire Feb. 25.

NEW YORK.—J. P. Morgan & Co., it is understood, have awarded a $150,000,000 shell contract to the Crucible Steel Co. of America; the shells are to be shipped to England.

NEW YORK.—Kellogg, Emery & Cuthell, 52 Broadway, have purchased a 150-acre lot in Roosevelt, N. J., on which a steel plant will be erected.

NEW YORK.—Inquiries have been circulated here by Atlantic Coast line for a steam hammer, radial drill, multiple drill, accumulator, sectional hydraulic flanging press and several punches and shears.

WATERTOWN, N. Y. — Northern New York Utilities, has increased its capital stock from $2,000,000 to $4,000,000.

ALLENTOWN, PA.—Traylor Engineering & Mfg. Co., which recently bought a large quantity of machinery for making shrapnel, will buy machinery that practically will duplicate that previously purchased, if it closes on another contract on which it now is figuring.

BEAVER FALLS, PA.—Borough will build a reinforced concrete sewage disposal plant, to cost $18,000; Leo Hudson, architect and engineer, House building, Pittsburgh, has plans.

BELLEFONTE, PA. — Bids have been asked on a blast furnace owned by the Bellefonte Furnace Co., which is to be dismantled and disposed of as scrap and second hand material; the stack is 16 x 70 feet, and has three Whitewell stoves.

BOSTON.—This city has let contract to Whiton & Haynes Co., Boston, for a 4-story industrial school for boys to be built at Parker and Archibald streets, in Roxbury, at a cost of $271,000.

NEW CASTLE, PA.—Bessemer Limestone Co., with offices at Youngstown, O., has increased its capital stock from $470,000 to $483,000.

NEW CASTLE, PA.—Re-Ac Co., shock absorbers, etc., has been incorporated; $30,000 capital stock; by John Elder Jr., S. P. Emery, Harry B. Cubbison, Thomas Ligget Jr., Luther

CENTRAL STATES

ASHTABULA, O. — County commissioners will consider the erection of a bridge across Ashtabula creek, between Ashtabula and Plymouth townships.

CANTON, O.—M. V. Crowl, county commissioner, says a bridge will be erected across East Creek at Eighth street.

CLEVELAND. — Standard Car Wheel Co. has increased its capital stock from $150,000 to $175,000.

CLEVELAND.—Theodor Kundtz Co., manufacturer of furniture, cabinets, auto bodies, wheels, trucks and other articles made of wood or metal and their component parts, has been incorporated; $2,000,000 capital stock;

"GRIPWELL"

TRADE MARK

PULLEY COVERING

Stops Power Losses and Belt Burning

BELT slipping gives your engineer his young grey hairs and works untold havoc with your fuel bills, sending them skyhooting high regardless of the work you get done. Temporary tinkering—adding idlers, tightening belts, etc.—only increases the effect without touching cause, and adds to your troubles, burnt belts and overheated bearings. The cause lies in the fact that belt does not get a grip on the smooth polished pulley face.

"Gripwell" Pulley Covering gives the pulley a leather-like surface, just rough enough to enable the belt to exert its maximum amount of power, without necessitating it being tightened, and will enable you to get greater efficiency from your plant.

"Gripwell" Pulley Covering permanently stops all belts from slipping and increases their driving power.

—Permits the belts to run 1-3 slacker under full load.
—Will eliminate taking up belts.
—Prolongs the life of belts and increases the life of bearings and machinery.
—Is waterproof and is a preservative, and will not dry, harden, or crack your belts.
—Will save money in belts, time, labor, oil, power and fuel.

It usually takes years to collect a large number of testimonial letters. We have hundreds of them from some of the most prominent manufacturing concerns. We shall be pleased to refer you to some of these concerns if you will write for our illustrated folder No. 16.

Sold on Five-Year Guarantee

"Gripwell" Pulley Covering is guaranteed for five years if applied according to directions and is not affected by acids, fumes, smoke, steam or climatic conditions.

Special 30-Day Free Trial Offer

So certain are we that "Gripwell" Pulley Covering will sustain our claims and give perfect satisfaction, that we will send a 10-pound can (trial size) for 30 days free trial.

Test it thoroughly on 3 or 4 pulleys—and if at the end of that time you are not convinced that "Gripwell" Pulley Covering will do exactly what we claim return unused portion and no charge will be made for portion used.

Prices F. O. B. New York, Order Direct

The cost of "Gripwell" Pulley Covering is 75 cents per pound. It is packed in strong air tight cans ranging from 10 pounds upward. Full instructions for applying are labeled on each can.

"Gripwell" Pulley Covering Company

601 Candler Building, New York City

by Theodor Kundtz, Theodor Kundtz Jr., Nick Winkel, Joseph J. Gedeon, Frank Friedle, Bela Kormandy and Mial Stephen Edgerly.

HAMILTON, O.—Richwood-Hamilton Traction Co. has been incorporated; $10,000 capital stock; Eugene Furtelle, G. J. Litsky, George Myers and M. B. Hoffman.

HAMILTON, O.—General manager of the Cincinnati, Hamilton & Dayton railroad, Cincinnati, has received bids for the proposed roundhouse at Ninth and Long streets, Hamilton, to cost about $30,000.

HAMILTON, O. — County commissioners have rescinded their action in regard to awarding the contract for the Woodsdale bridge and will receive bids until March 24 for a bridge at Woodsdale 600 feet long.

LORAIN, O.—Citizens in an unofficial vote, under the supervision of a special committee of the council, favor the establishment of a municipal electric light plant; franchise of the Citizens Gas & Electric Co. expires next year.

ORRVILLE, O.—Sanderson Cycle Drill Co. has purchased the greater part of the stock of the Cyclone Drill Co. and will assume management at once; R. R. Sanderson, president; H. Hildebrand, Washington Court House, O., secretary; the new company will make either additions to the plant or seek a larger site.

SALEM, O.—City council has instructed the service director to inquire as to the cost of a low pressure, steam driven, turbo-generator of sufficient capacity to service the municipal system.

SANDUSKY, O.—Roberts Motor Mfg. Co. has been incorporated; $50,000 capital stock; by E. B. King, W. H. Burke, R. K. Ramsey, and Joseph C. Pyle.

TOLEDO, O.—American Pipe & Tube Co. has been incorporated; $10,000 capital stock; by W. B. McCarthy, et al.

TOLEDO, O.—Success Rubber Co. has increased its capital stock from $5,000 to $100,000.

TOLEDO, O.—Schiewe Storage Co., Detroit, is having plans prepared for a 7-story warehouse, to be erected in Toledo; M. and M. Stophlet, 606 Nasby building, architects.

TOLEDO, O.—A. W. Bordman, director of public service, will receive bids until noon, March 18, for the construction and equipment of a high-pressure fire service pumping station; 5 per cent of bid required.

UHRICHSVILLE, O. — American Sewer Pipe Co.'s plant suffered about $60,000 loss by fire.

YOUNGSTOWN, O.—Youngstown Iron & Steel Co. will award contracts shortly for a 30-inch, two-high blooming mill and equipment and a 28-inch bar mill and equipment; Julian Kennedy, Pittsburgh, is in charge.

CHARLESTON, W. VA.—Pavey Electric Co., Charleston, with works at Dunbar, W. Va., soon will begin erection of a modern iron and brass foundry, for which it is in the market for complete equipment and supplies.

PARKERSBURG, W. VA.—B. & O. railroad is considering the erection of a freight depot, to cost about $500,000, in Parkersburg.

PARKERSBURG, W. VA. — Parkersburg, Marietta & Interurban Railway Co. will begin in the spring the erection of a $500,000 generating station, to take place of present power house; Sanderson & Porter, New York City, electrical engineers, are expected to have preliminary details ready within 60 days.

WHEELING, W. VA.—Permits have been issued for the erection of a $25,000 addition to the plant of the J. E. Moss Iron Co.

LOUISVILLE, KY.—Henry Vogt Machine Co. has fixed its capital stock at $500,000.

EVANSVILLE, IND.—Bedford-Nugent Co., construction, has been incorporated; $50,000 capital stock; by William and J. W. Bedford and James Nugent.

INDIANAPOLIS.—Day-lite Gas Co. has been incorporated to manufacture gas; $25,000 capital stock; by Louis Wagschal, Chas. G. Avey, Vern I. Reed, et al.

INDIANAPOLIS.—U. S. Distributors have been incorporated to manufacture confectionery machinery; $100,000 capital stock; by Edwin S. Walker, E. W. Niermann, Arthur Ford, et al.

INDIANAPOLIS. — Weidely Motor Co., manufacturer of motor vehicles and accessories, has been incorporated; $100,000 capital stock; by George A. Weidely, W. Edward Showers, Edmund Rosenberg, William A. Humphrey and Louis A. Poundstone.

LAFAYETTE, IND. — Schwab Safe Co., manufacturer of safes and vaults, has been incorporated; $75,000 capital stock; by Frank Loeffler, Samuel A. Cahn and Guy Foreman.

SYRACUSE, IND. — Syracuse Power & Light Co. has increased its capital stock to $55,000.

BLOOMINGTON, ILL. — Imperial Brass Co. has been incorporated to manufacture tools, implements and specialties; $75,000; by A. C. Eddy, C. C. Gilliland and J. E. Ijams.

CHICAGO.—Santa Fe railroad has placed orders for a few machine tools.

CHICAGO.—Auditzer Co. has been incorporated to deal in machinery; $5,000; by Wm. R. Swissler, Harry A. Pillman and Harry Gordon, 133 West Washington street.

CHICAGO. — Superior Car Metal Roofing Co. has been incorporated to manufacture car roofs, doors, locks, etc.; $25,000; by Wm. H. Slatten, Wm. F. Nolan and E. A. Albright.

CHICAGO.—Chicago Steel Post Co. has been incorporated to manufacture steel posts and accessories; $10,000; by Joseph K. Ryan, Walter P. Baker and David Levison, 69 West Washington street.

CHICAGO.—Ben Rigby, Inc., has been incorporated to manufacture hot water, steam and hot air heating apparatus; $10,000; by T. J. Mullen, H. W. Beaton and Ben Rigby, 545 West Lake street.

CHICAGO. — Chicago Conveyor Co. has been incorporated to manufacture conveyors and machines; $25,000; by Wm. H. MacLean, Earle F. Tilley, 324 East Sixtieth street and J. F. Eames, 69 West Washington street.

CHICAGO.—American Welding Co., 2637 South Michigan avenue, has been chartered to make oxy-acetylene welding and cutting outfits; $2,500; Arthur J. Emrich, Anna J. Emrich and Chas. Emrich, incorporators.

CHICAGO.—A. S. Alschuler, architect, is preparing plans for E. Elger & Bros., hat manufacturers, for a $350,000, 14-story office building, 40 x 100 feet, at Randolph and Dearborn streets.

CHICAGO.—Hatzfield & Knox, 7 South Dearborn street, have plans for a foundry and machine shop for the Chicago Faucet Co., makers of plumbers' supplies, 315 South Clinton street; building will be 50 x 125 feet, including office space, and is designed to carry an additional story.

CHRISTOPHER, ILL.—John Dye, mayor, will take bids in May or June on a water works system to cost $65,000, including intake pipe and mains and pumping equipment for 750,000 to 1,000,000 gallons per day.

DANVILLE, ILL.—Conron Mfg. Co. has been incorporated to manufacture castings and tools; $25,000; T. W. Conron, F. E. Lessure and M. F. Keegan.

OTTAWA, ILL.—Matthiessen & Hegeler Zinc Co. will enlarge its rolling mill in La Salle, Ill.

ROCKFORD, ILL.—Rockford Drop Forge Co. has increased its capital from $100,000 to $200,000.

ROCKFORD, ILL. — Central Machine & Tool Co. has been incorporated to do a general engine and machinery business; $2,500, by Geo. A. Daniels, John A. Linden and Harry B. North.

ALMA, MICH.—Alma Standard Foundry Mfg. Co. will increase the size of its plant as the result of a contract with the Ann Arbor railroad to furnish all castings for the railroad for 1915.

BENTON HARBOR, MICH.—Benton Harbor Malleable Foundry Co. has increased its capital stock from $250,000 to $300,000.

DETROIT.—Rotary Motor Co. has been incorporated; $100,000 capital stock; by Charles Baker, August Williams, Andrew Santer.

DETROIT. — Barklay, Parsons & Klapp, engineers, have drawn plans for the proposed $1,800,000 Belle Isle bridge, which call for a bridge of the jackknife type.

DETROIT.—Pollmar & Ropes, 602 Sun building, is taking bids to close March 10 on a $12,000 foundry building for Scott Bros. Electric Co., four stories, 28 x 105 feet, of brick, structural steel and iron columns.

SCHOOLCRAFT, MICH. — Citizens voted Feb. 9 to issue $22,000 bonds for water works; plans are being prepared by Smith & Boulay, Toledo, O.

BELOIT, WIS.—R. & L. Instrument Co. has been organized to manufacture electric signal devices for automobiles and motor trucks; capital stock $25,000; promoters are H. D. Ball, Leonard Carr, James Keeley and J. C. Floyd, joint patentees of several devices.

CHIPPEWA FALLS. — Tilden Electric Light & Power Co. has been organized by B. J. and E. G. Walter; the capital stock is $10,000.

DELAVAN, WIS.—Harvey Zillhart and Eugene Fey have organized the firm of Fey & Zillhart to do a general sheet metal manufacturing and construction business, and have leased the Chesebro block at 123-125 South Second street as a workshop.

MARKESAN, WIS.—Markesan Electric Co., which just has been organized with $10,000 capital, proposes to build transmission lines from Ripon to Markesan and operate a commercial lighting system as well as furnishing municipal current.

MILWAUKEE.—Federal Pressed Steel Co. is in the market for two turret lathes.

MILWAUKEE.—Wausau Foundry & Machine Co. has increased its capital stock from $25,000 to $30,000.

MILWAUKEE.—United States Refining Co. has been organized with a capital stock of $100,000 to establish a large beet sugar refinery; J. A. Schulte, W. H. Heidemann and H. H. Schlaeger are the promoters.

MILWAUKEE. — Articles of incorporation have been filed in behalf of the Key Safe Co., of Milwaukee; capital stock, $25,000; incorporators are F. H. Becker, Frank X. Bergs and Joseph J. Zimmerman.

MILWAUKEE. — The Schlitz brewing interests of Milwaukee are said to be the promoters of a $350,000, 110 x 150-foot theater and store building at Grand avenue and Sixth street, plans for which are now in preparation by Kirchoff & Rose, Majestic building, Milwaukee, work is to begin about April 1.

MILWAUKEE.—N. A. Christensen Co. has been organized with $50,000 capital by N. A. Christensen, president of the Christensen Engineering Co., and founder of the National Brake & Electric Co., to develop and produce a number of new inventions. R. L. Gruber is associated with Mr. Christensen in the enterprise.

MILWAUKEE.—Northwestern Iron Co. of Milwaukee, with furnaces and coke ovens at Mayville, Wis., has been ordered by the Wisconsin railroad commission to install a 27-foot steel gate, 5 feet high, in its large concrete dam at Mayville by July 1; the gate is to prevent flooding of property above the dam during spring freshets.

MILWAUKEE.—B. J. Johnson Soap Co., Fourth and Fowler streets, has engaged Lockwood & Greene, architects, Chicago, Ill., to make plans for a $140,000 factory addition ad-

joining a $100,000 warehouse addition now being completed; the new factory will be of reinforced concrete, brick and steel, 130 x 133 feet, 6 stories high; the requirements will include nearly 100 tons of column caps and a like tonnage of columns, reinforcing bars, etc.

POYNETTE, WIS. — Poynette Electrical Co., Perry L. Speed, president, has been granted a franchise to erect and operate an electric light and power plant for commercial purposes; Mr. Speed has leased the Poynette water power and will install generating equipment and build transmission lines.

TWO RIVERS, WIS.—Standard Aluminum Co., has decided to increase its capital stock from $250,000 to $500,000 to provide for the increasing business; the Alexander warehouse, held under lease, has been bought and it is proposed to make extensions to the factory during the year.

WAUSAU, WIS.—The plant of the Marathon Electric Mfg. Co., is being operated at capacity, manufacturing small motors; the company plans to increase production at once; J. S. Alexander is president.

WITWEN, WIS.—Troy & Honey Creek Telephone Co. has been incorporated here with $20,000 capital by Elias, Mary, Ellen and Newton G. Witwen to build and operate a local and interurban telephone system.

CHILLICOTHE, MO.—Harper & Stiles, Kansas City, Mo., are engineers for water works improvements to cost $135,000, including a new plant, filtration system and pumps.

ST. LOUIS.—Thermo-Automatic Stove Co. has increased its capital stock from $10,000 to $50,000.

CEDAR RAPIDS, IA.—National Steel Post Co. has been incorporated to take over the patents and plants of the Slauson Mfg. Co., of Cedar Rapids, manufacturer of steel fence poses and other farm equipments; it is intended to erect a factory, 60 x 200 feet, and to buy a hot galvanizing plant and a gang punch; Luther A. Brewer is president and L. E. Slauson, general manager.

EAGLE GROVE, IA.—It is reported the Chicago & Northwestern railroad plans the erection of a roundhouse and machine shops this year, to cost not more than $100,000.

LINN GROVE, IA.—Citizens voted Feb. 10 to issue $9,000 bonds for construction of water works.

SCHLESING, IA.—City, B. M. Ambresen, clerk, has voted bonds for a $16,000 electric light plant.

DULUTH, MINN.—Plans will be ready shortly for the Duluth Ice Co.'s artificial ice plant at St. Croix avenue and Buchanan street, to cost about $80,000, of which $30,000 will be accounted for in the buildings.

ST. PAUL.—Equity Co-operative Grain Exchange has plans for the erection of a $200,000 grain elevator.

SOUTH ST. PAUL, MINN.—South St. Paul Machinery Co. has been incorporated to manufacture farm implements, sand diggers and other machinery; $25,000 capital stock; by Emil Gardie, South St. Paul; Marion M. Hill, St. Paul; J. Lynd Evans, Minneapolis.

SOUTHERN STATES

BRISTOL, VA. — Bristol Iron & Wire Works, Inc., has been incorporated; $3,000 capital stock; J. G. Tilley, president; F. A. Reimann, secretary.

ASHEVILLE, N. C.—Carolina Veneer Co. will rebuild its plant, badly damaged by fire, at a cost of about $100,000; new equipment will be purchased for the entire plant.

ASHEVILLE, N. C.—Lockwood, Green & Co., Atlanta, Ga., are preparing plans for extensive additions to the French Broad Mfg. Co.'s plant, to include spinning mill and storehouse.

ATLANTA, GA.—Architect P. A. Dallas is drawing plans for a three-story 132 x 315-foot cotton mill and a large power plant to be erected at Lagrange, Ga.

LAKELAND, FLA.—Board of bond trustees, C. D. Clough, secretary, will receive bids until March 18 for $130,000 water and light bonds.

FORT WORTH, TEX. — National Metal Weather Strip Co., of Texas, has been incorporated; $1,000 capital stock; by R. J. Pence, W. F. Fry and E. A. Jackson.

OKLAHOMA CITY, OKLA.—Alva, Buffalo & Colorado railroad has been incorporated with $10,000 capital stock to erect a line from Rosston, Okla., to Buffalo, Okla., at a cost of about $250,000; incorporators: J. H. Moran, L. A. and L. L. Walton, George Stafford and Ida M. Morgan, all of Alva, Okla.

VINITA, OKLA.—Vinita Brass Works has been incorporated; $50,000 capital stock; by J. P. Watkins, J. M. Jones and L. N. Ditto.

WESTERN STATES

NORTH PLATTE, NEB. — County clerk will receive bids until March 17 for constructing a bridge across the North Platte river, about 2 miles east of New Platte; two designs will be considered on a reinforced concrete bridge of the balanced arch type, composed of two 60-foot, two 65-foot, two 70-foot, two 75-foot and two 80-foot arches, with 16 or 20-foot roadway; and the other a high truss steel bridge composed of five 135-foot skew spans, 16-foot roadway, concrete floor with concrete piers, and concrete abutments resting on steel and wooden piling; bids will be received on the yardage basis for making fills and approaches, there being about 25,000 cubic yards of fill and about 3,000 cubic yards of surfacing.

OTTAWA, KAS. — Warner Industries will erect a malleable iron foundry in Ottawa.

BILLINGS, MONT.—Work is to be started at once on the construction of two additions to the refinery of the B. & M. smelter; structures will be 1-story, of steel and concrete, faced with brick, and cost about $1,000,000; W. H. Tanner is chief engineer and J. H. Klepinger is superintendent of the plant.

BOISE, IDA.—Public utilities commission has granted a certificate to the Ashton & St. Anthony Power Co. to build a power plant on the north fork of the Snake river, near Ashton, Ida.

MONTESANO, WASH.—Gas Service Corporation of America has awarded contract to Sidney Burnett, Seattle, for remodeling the old box factory and installing gas machinery at an estimated cost of $40,000.

OYMPIA, WASH.—County commissioners will assist in construction of a bridge of either concrete or concrete with steel I-beams at Tumwater.

WALLA WALLA, WASH.—Bateman Harvester Co. has been incorporated; $100,000 capital stock; by P. B. Bateman, et al.

FRIEND, ORE.—Friend Mill & Improvement Co. is preparing to erect a 30,000-foot capacity mill in Friend.

McMINNVILLE, ORE. — Yamhill Electric Co., Newberg, Ore., will erect a power line on the roads out from Carlton.

STAYTON, ORE.—Harden Pump Fountain Co., Eugene, Ore., may locate a $20,000 plant in Stayton.

SUMPTER, ORE.—American Smelting & Refining Co. has purchased the Ben Harrison mine in the Greenhorn district, Oregon; a dredge was operated on the property several years ago and a larger plant is to be installed.

LONG BEACH, CAL.—Chemical Pigment Co. has been incorporated for $1,000,000, with W. H. Covert, Long Beach, as one of the incorporators; company plans to erect a $250,000 plant in Long Beach for the manufacture of white lead.

Chalk Up!

Willie Hoppe, the premier billiardist, can't play a good game on the green cloth without a first-class tip on a first-class cue.

In this column each week we furnish the tips; to grasp the tips is up to you; got your cue?

Pavey Electric Co., Charleston, W. Va., with works at Dunbar, W. Va., soon will begin the erection of an iron and brass foundry and is in the market for complete equipment. The company also will buy supplies for the new plant.

Federal Pressed Steel Co., Milwaukee, is in the market for two turret lathes.

Pratt & Whitney Co., Hartford, Conn., has purchased some additional machine tools for its new plant and still is in the market for a large amount of miscellaneous equipment.

Robbins Dry Dock & Repair Co., 15 Whitehall street, New York City, is taking bids on a 1-story, 80 x 200 foot machine shop to be built at Erie basin, Brooklyn.

Delaware, Lackawanna & Western railroad, New York City, has inquired for a vertical milling machine and a 36-inch lathe.

Wm. Beckers Aniline & Chemical Works, 105-113 Underhill avenue, Brooklyn, N. Y., has purchased 15 acres near Jamaica Bay and will begin work at once on a large power house and 22 other buildings.

Southern Textile Machinery Co., Paducah, Ky., will buy milling and boring machines, punch presses, etc.

Weller-Hoard Table Co., Morristown, Tenn., has leased a building and will purchase power and woodworking equipment; address H. W. Weller.

Pucketts Creek Coal Co., Burchfield, Ky., is in the market for power equipment, including boilers, engine, generator, motors, fans, etc., for its proposed mining plant.

Alloy Steel Forging Co., Carnegie, Pa., which recently closed for a 20-ton crane and a guillotine shear, is negotiating for a set of straightening rolls and a set of bending rolls. W. S. Potter, Manufacturers building, Pittsburgh, is president.

Westinghouse Air Brake Co., with shops at Wilmerding, Pa., is asking bids on ten grinders for the manufacture of war materials.

Youngstown Iron & Steel Co. will award contracts shortly for a 30-inch, 2-high blooming mill and equipment and a 28-inch bar mill and equipment. Julian Kennedy, engineer, Pittsburgh, is in charge.

National Steel Post Co. has been incorporated to take over the patents and plant of the Slauson Mfg. Co., Cedar Rapids, Ia., manufacturer of steel fence posts and other farm equipment. It is intended to erect a factory, 60 x 200 feet, and to buy a hot galvanizing plant and gang punch. Luther A. Brewer, president; L. E. Slauson, general manager.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to April 1.)

Bessemer, valley	$13.60
Bessemer, Pittsburgh	14.55
Basic, Pittsburgh	13.45
Basic, eastern Pa.	14.00
Malleable, Pittsburgh	13.80 to 14.45
Malleable foundry, Chicago	13.00 to 13.50
Malleable foundry, Philadelphia	15.00 to 15.25
Malleable foundry, Buffalo	12.50 to 13.00
No. 1X foundry, Philadelphia	14.54 to 14.79
No. 2 foundry, Pittsburgh	13.80 to 14.45
No. 2 foundry, valley	13.00 to 13.50
No. 2 foundry, Cleveland	13.50
No. 2 foundry, Ironton	12.75 to 13.00
No. 2 foundry, Chicago	13.00 to 13.50
No. 2X foundry, Philadelphia	14.29 to 14.54
No. 2X fdy., N. J. tidewater	14.24 to 14.49
No. 2X foundry, Buffalo	12.50 to 13.00
No. 2 plain, Philadelphia	14.00 to 14.25
No. 2 plain, N. J. tidewater	14.04 to 14.29
No. 2 plain, Buffalo	12.25 to 12.75
No. 2 southern, Birmingham	9.50 to 10.00
No. 2 southern, Cincinnati	12.40 to 12.90
No. 2 southern, Chicago	13.50 to 14.00
No. 2 southern, Phila. delivery	14.00 to 14.50
No. 2 southern, Cleveland	13.50 to 13.75
No. 2 south'n, New York, docks	13.75 to 14.00
No. 2 southern Boston, docks	13.75 to 14.25
No. 2 south'n, interior New Eng.	14.50 to 15.50
No. 2 southern, St. Louis	14.00 to 14.25
Virginia No. 2X furnace	12.50 to 12.75
Virginia 2X, Philadelphia	15.25 to 15.50
Virginia 2X, Jersey City	15.50 to 15.75
Virginia 2X, Boston points	15.75 to 16.00
Gray forge, eastern Pa.	13.25 to 13.50
Gray forge, Pittsburgh	13.45 to 13.70
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Jackson, O.	15.50 to 15.75
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	19.00 to 20.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.50
Charcoal, Buffalo	15.75 to 17.00
Charcoal, Birmingham	25.00

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.50
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.85

(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	7½c to 8½c
For'n non-Bess., 50 to 65 per cent	7½c to 8½c

COKE

(At the ovens)

Connellsville furnace	$1.55 to 1.65
Connellsville fur. contr.	1.65 to 1.75
Connellsville foundry	2.00 to 2.40
Connellsville fdy., contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.10 to 2.40
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.00
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro-mang., Balti. (prompt)	$90.00 to 100
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent, Pbg.	22.90
Ferro-sil., 11 to 12 per cent, Pgh.	21.90
Ferro-sil., 10 to 11 per cent, Pgh.	20.90
Ferro-sil., 9 to 10 per cent, Pgh.	19.90
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Open-hearth billets, Phila.	$21.56 to 22.56
Forging billets, Phila.	24.56 to 25.56
Forging billets, Pbgh.	24.00 to 24.50

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.45
From Pittsburgh	.619
From Youngstown	.639
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Wire rods, Pittsburgh	$25.00 to 26.00
Billets, Pittsburgh	19.50 to 20.50
Billets, Youngstown	18.50 to 19.50
Sheet bars, Pittsburgh	20.00 to 21.00
Sheet bars, Youngstown	19.00 to 20.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs., Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chicago	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c
Angle bars, st. sections, Chgo.	1.50c
Spikes, railroad, Pbgh.	1.35c to 1.40c
Spikes, railroad, Chgo.	1.50c
Track bolts, Pbgh.	1.85c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	3.00
New England	3.00
Philadelphia	2.79
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail).	2.58
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.15c
Structural shapes, Chicago	1.34c
Structural shapes, Philadelphia	1.259 to 1.309c
Structural shapes, New York	1.269 to 1.319c
Structural shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.34c
Tank plates, Pittsburgh	1.15c
Tank plates, Philadelphia	1.259c to 1.309c
Tank plates, New York	1.269c to 1.319c
Bars, soft steel, Pittsburgh	1.15c
Bars, soft steel, Chicago	1.34c
Bars, soft steel, Philadelphia	1.259c to 1.309c
Bars, soft steel, New York	1.269c to 1.319c
Hoops, carloads, Pittsburgh	1.25c to 1.50c
Hoops, less carloads, Pittsburgh	1.30c
Bands, Pittsburgh	1.15c
Shafting, carloads, Pbgh., disc. contract	67 to 68
Bar iron, Chicago	1.07½c to 1.10c
Bar iron, Philadelphia	1.125c to 1.175c
Bar iron, New York	1.125c
Bar iron, Cleveland	1.15c
Bar iron, Pittsburgh	1.10c to 1.15c
Hard steel bars, Chicago	1.20c to 1.25c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.80c to 1.90c
No. 28, black, Chicago	1.94c to 1.99c
No. 28, tin mill, black, Pbgh.	1.85c to 1.90c
No. 28, galvanized, Pbgh., nom.	3.40c
No. 28, galvanized, Chgo. (nom.)	3.59c
No. 10, blue, annealed, Pbgh.	1.30c to 1.35c
No. 10, blue, annealed, Phila.	1.509c
Tin plate, 100 lb., coke base	$3.10 to 3.20

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll., and re-anl.	30 cents
Hot roll'd, pickl'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller levelling	10 cents
Patent levelling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ¾ to 3 inches	80	69½
Iron, ¾ to 2½ inches	70	59
	Lap-weld.	
Steel, 2½ to 6 inches	79	68½

BOILER TUBES

Steel, 3½ to 4½ inches	74
Iron, 3½ to 4½ inches	60

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nails, jobbers, Pittsburgh	$1.60
Plain wire, jobbers, Pittsburgh	1.40
Galvanzed wire, jobbers, Pbgh.	1.90
Polished staples, Pbgh.	1.60
Galvanized staples, Pbgh.	2.10
Barb wire, painted, jobbers, Pbgh.	1.60
Barb wire, galv., jobbers, Pbgh.	2.10

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 20; cut threads 80 and 15; larger or longer, 75 and 15.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled, 80 and 25; cut, 80 and 20; larger or longer, 80.

Gimlet and cone point lag or coach screws, 85 and 5.

Hot pressed square, blank or tapped nuts, $6.50 off list; hot pressed hexagon blank or tapped, $7.40 off.

Cold pressed, square, blank or tapped, $6.20 off; hexagon, blank or tapped, ⅜ inch and larger, $7.50; ⅝-inch and smaller, $8.00.

RIVETS

Structural rivets, Pbgh	1.45c to 1.50c
Structural rivets, Chgo	1.68c
Boiler rivets, Pbgh	1.55c to 1.60c
Boiler rivets, Chgo	1.78c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

COLD ROLLED STRIP STEEL

(Subject to regular extras.)

0.10 to 0.19 Carbon.	Base price Cut to length	
	Hard.	Soft.
1½ inch and wider	2.85	3.10
0.100 and thicker	2.85	3.10
0.050 to 0.099 inc.	2.95	3.20
0.035 to 0.049 inc.	3.10	3.35
0.031 to 0.034 inc.	3.35	3.75
0.025 to 0.030 inc.	3.60	4.00
0.020 to 0.024 inc.	3.80	4.20
0.017 to 0.019 inc.	4.70	5.20
0.015 and 0.016	5.10	5.60
0.013 and 0.014	5.95	6.45
0.012	6.55	7.05
0.011	6.90	7.40
0.010	7.25	7.75
	Coils.	
0.100 and thicker	2.75	3.00
0.050 to 0.099 inc.	2.80	3.05
0.035 to 0.049 inc.	2.95	3.20
0.031 to 0.034 inc.	3.10	3.50
0.025 to 0.030 inc.	3.20	3.60
0.020 to 0.024 inc.	3.30	3.70
0.017 to 0.019 inc.	3.60	4.10
0.015 and 0.016	4.00	4.50
0.013 and 0.014	4.70	5.20
0.012	5.05	5.55
0.011	5.40	5.90
0.010	5.75	6.25

CAST IRON WATER PIPE

Three to 20 in., Cleveland	$21.50
Twenty-four to 48-in., Cleveland	21.00
Four-inch, Chicago	26.00
Six to 12 inches, Chicago	24.00
Large sizes, Chicago	23.00
Six-inch, New York	20.00 to 20.50
Four-inch, Birmingham	19.50
Six-inch and larger, Birmingham	19.50

Gas pipe, $1 per ton higher than water.

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.70c to 1.80c
Steel bars, Philadelphia	1.65c to 1.70c
Steel bars, New York	1.80c
Steel bars, St. Louis	1.70c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, St. Louis	1.65c
Iron bars, Cincinnati	1.60c to 1.70c
Iron bars, Philadelphia	1.60c to 1.65c
Iron bars, New York	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.80c to 1.85c
Shapes and plates, St. Louis	1.80c
Shapes and plates, Philadelphia	1.65c to 1.70c
Shapes and plates, New York	1.85c
No. 10 blue anl. sheets, Chgo	1.95c
No. 10 blue anl. sheets, Cleve	2.05c
No. 10 blue anl. sh. St. Louis	2.00c
No. 10 blue anl. sheets, Cinci	1.95c
No. 28 black sheets, Chgo	2.55c
No. 28 black sheets, Cleveland	2.45c
No. 28 black sheets, Cincinnati	2.45c to 2.55c
No. 28 black sheets, St. Louis	2.55c
No. 28 galv. sheets, Chgo	3.75c
No. 28 galv. sheets, Cleveland	3.50c
No. 28 galv. sheets, Cincinnati	3.40c to 3.55c
No. 28 galv. sheets, St. Louis	3.70c

Freight Rates, Coke

Connellsville regions, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

No. 1 railroad wrought, Chgo	$ 9.00 to 9.50
No. 1 railroad wrought, Cleve	9.25 to 9.75
No. 1 railroad wrought, St. L	8.50 to 9.00
No. 1 railroad wrought, Cincin	8.00 to 8.50
No. 2 railroad wrought, Chgo	8.75 to 9.00
No. 2 railroad wrought, St. L	8.25 to 8.50
Arch bars and transoms, Chgo	12.50 to 13.00
Arch bars and transoms, St. L	11.00 to 11.50
Knuckles, coup. & spr'gs, Chgo	8.75 to 9.00
Knuckles, coup. & spr'gs, St. L	8.50 to 9.25
Iron car axles	14.25 to 14.75
Shafting, Chicago	11.75 to 12.25
Shafting, St. Louis	11.00 to 11.50
Steel car axles, Chicago	11.25 to 11.75
Steel car axles, St. Louis	10.00 to 10.50
Locomotive tires, Chicago	9.00 to 9.50
Locomotive tires, St. Louis	8.75 to 9.25
Cut forge, Chicago	8.50 to 9.00
Pipes and flues, Chicago	7.00 to 7.50
Pipes and flues, Cleveland	7.25 to 7.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, (all rail)	80 cents
Pacific coast, via Panama canal	61.9 cents

Pipes and flues, St. Louis	5.75 to 6.25
No. 1 cast, Chicago	9.00 to 9.25
No. 1 cast, Cleveland	10.00 to 10.50
No. 1 cast, Cincinnati	8.50 to 9.00
No. 1 cast, St. Louis	9.00 to 9.25
No. 1 busheling, Chicago	8.00 to 8.25
No. 1 busheling, Cleveland	8.25 to 8.50
No. 1 busheling, Cincinnati	5.75 to 6.25
No. 1 busheling, St. Louis	7.50 to 7.75
No. 2 busheling, Chicago	7.00 to 7.50
No. 1 boiler plate, cut, Chgo	5.50 to 5.75
No. 1 boiler plate, cut, St. L	5.50 to 5.75
Boiler punchings, Chicago	8.25 to 8.75
Cast borings, Chicago	5.00 to 5.50
Cast borings, Cleveland	6.00 to 6.25
Cast borings, Cincinnati	4.25 to 4.75
Cast borings, St. Louis	5.00 to 5.50
Machine shop turnings, Chicago	5.50 to 5.75
Machine shop turnings, Cleve	5.50 to 5.75
Machine shop turnings, Cinci	$ 4.25 to 4.75
Machine shop turnings, St. L	5.50 to 6.00
Malleable agl., Chicago	7.50 to 7.75
Malleable agricultural, St. Louis	6.50 to 7.00
Malleable, railroad, Chicago	7.75 to 8.25
Malleable, railroad, Cincinnati	7.00
Malleable, railroad, St. Louis	7.00 to 7.50
Angle bars, iron, Chicago	11.75 to 12.25
Angle bars, iron, St. Louis	10.00 to 10.50
Angle bars, steel, Chgo	8.25 to 8.50
Angle bars, steel, St. Louis	8.00 to 8.25
Stove plate, Chicago	8.25 to 8.50
Stove plate, Cleveland	7.75 to 8.00
Stove plate, Buffalo	8.25 to 8.75
Stove plate, Cincinnati	6.50 to 7.00
Stove plate, St. Louis	7.25 to 7.50
Bundled sheet, Cincinnati	4.00 to 4.50

(Gross tons.)

Heavy melting steel, Pbgh	$12.00
Heavy melting steel, Buffalo	10.25 to 10.75
Heavy melting steel, Chgo	9.75 to 10.25
Heavy melting steel, Cleveland	9.75 to 10.50
Heavy melting steel, Cincinnati	9.00 to 9.50
Heavy melting steel, eastern Pa.	10.25 to 10.50
Heavy melting steel, New York	8.25 to 8.50
Heavy melting steel, St. Louis	9.25 to 9.50
Bundled sheet, Buffalo	7.00 to 7.50
Grate bars, Buffalo	9.00 to 9.50
Grate bars, New York	6.50 to 7.00
No. 1 railroad wrought, east. Pa.	11.75 to 12.00
No. 1 railroad wrought, Pbgh	10.25 to 10.75
No. 1 R. R. wght., New York	9.50 to 10.00
No. 1 R. R. wrought, Buffalo	10.00 to 10.50
Shafting, New York	12.00 to 12.50
Shafting, eastern Pa.	14.00 to 14.50
Wrought pipe, New York	7.50 to 8.00
Wrought pipe, eastern Pa.	10.25 to 10.50
Mch. shop turnings, New York	5.75 to 6.25
Machine shop turnings, Buffalo	5.50 to 6.00
Mch. shop turnings, Pbgh	7.75 to 8.00
Mch. shop turnings, eastern Pa.	7.75 to 8.25
Cast borings, New York	5.75 to 6.25
Cast borings, eastern Pa.	7.75 to 8.25
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Pittsburgh	8.25 to 8.50
Stove plate, N. J. points	8.50 to 8.75
Stove plate, Pittsburgh	8.25 to 8.75
Stove plate, eastern Pa.	9.00 to 9.50
Shoveling steel, Chicago	9.00 to 9.50
Shoveling steel, St. Louis	8.00 to 8.50
Reroll'g rails, 5 ft. & ov., Pbgh	12.50
Reroll. rails, 5 ft. & ov., Chgo	10.00 to 10.25
Reroll. rails, 5 ft. & ov., Cleve	11.00 to 11.50
Reroll. rails, 5 ft. & ov., E. Pa.	10.75 to 11.25
Reroll. rails, 5 ft. & ov., St. L.	10.00 to 10.50
Steel rails, short, St. Louis	9.50 to 9.75
Steel rails, short, Chicago	10.00 to 10.50
Steel rails, short, Cleveland	11.00 to 11.50
Steel rails, short, St. Louis	9.50 to 9.75
Iron rails, Cleveland nom.	11.75 to 12.00
Iron rails, Chgo	12.00 to 12.50
Iron rails, Cincinnati	10.25 to 10.75
Iron rails, eastern Pa.	13.50 to 14.00
Iron rails, St. Louis	10.00 to 10.50
Iron rails, Pittsburgh	13.00 to 13.50
Frogs, switches, guards, Chgo	9.25 to 9.50
Frogs, switches & g'rds, St. L.	9.25 to 9.50
Car wheels, (iron), Pittsburgh	10.50 to 11.00
Car wheels, (steel), Pittsburgh	11.50 to 12.00
Car wheels, Chicago	10.00 to 10.50
Car wheels, eastern Pa.	10.50 to 11.00
Car wheels, Buffalo	10.00 to 10.50
Car wheels, N. J. points	9.25 to 9.50
Car wheels, St. Louis	10.00 to 10.50
Iron axles, Pittsburgh	18.00 to 18.50
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa.	18.50 to 19.00
Iron axles, Buffalo	16.00 to 16.50
Iron axles, Chicago	15.75 to 16.25
Steel car axles, New York	11.50 to 12.00
Steel car axles, Buffalo	12.00 to 12.50
Steel car axles, Cleveland	12.50 to 13.00
Steel car axles, eastern Pa.	13.50 to 14.00
No. 1 busheling, Buffalo	7.50 to 8.00
No. 1 busheling, Pittsburgh	9.75 to 10.00
No. 2 busheling, Buffalo	5.25 to 5.75
Low phosphorus steel, Buffalo	12.50 to 13.00
Low phosphorus steel, Pbgh	13.00 to 13.25
Low phos. steel, eastern Pa.	13.50 to 14.00
No. 1 forge, eastern Pa.	7.75 to 8.25
No. 1 cast, eastern Pa.	12.00 to 12.50
No. 1 cast, Pittsburgh	11.75 to 12.00
No. 1 heavy cast N. J. points	11.00 to 11.50
Mall. iron, R. R., Cleveland	10.25 to 10.50
Malleable railroad, Pittsburgh	9.75 to 10.00
Malleable R. R., Buffalo	9.50 to 10.00
Malleable, R. R., east Pa.	8.50 to 9.00
Bundled sheet, Pittsburgh	9.00 to 9.25
Bundled sheet, Cleveland (nom.)	7.50

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PENTON'S BOOK NEWS, Cleveland, Ohio
42

Illinois Malleable Iron Co.
Chicago, Ill.

Malleable and Gray Iron

CASTINGS

How to Use the Sales Engineer

(*Continued from page* 463)

chine. As a matter of fact, some of the heavier machines are more easily manipulated than the lighter ones on account of the attention paid to this feature in the design.

I have seen an operator who had worked for 15 years on a horizontal chucking machine, "throw up his job" when a new and up-to-date turret lathe of heavy construction was installed to take the place of the old machine. Yet by dint of persuasion he was induced to reconsider the matter, so that after working on the new machine for a couple of weeks he could not have been hired to take his old machine back again, and yet he was turning out work for 40 cents apiece that had paid him a dollar under the old conditions. He was making a little more money each day and was making it with less trouble, so that he was perfectly satisfied.

It will be seen that the relation of the sales engineer to the operator in the factory of the customer is rather indirect at the time of the installation of a new machine, but if, through the efforts of the demonstrator and the salesman, an operator can be made to realize the importance and value of the engineer's experience, future suggestions will have greater weight and will result profitably to the management.

Keeping in Touch with the Sales Engineer

The function of the sales engineer in relation to the customer does not by any means cease on the installation of a machine, for his services are always at the customer's disposal regarding methods of handling new work, suggestions for tooling, etc. It is to every manufacturer's advantage to keep a customer satisfied with a machine and its production and he is always ready to assist in every possible way, even after the machine has been in use for some time. For this reason a manufacturer who is looking for high production on some new work will find it much to his advantage to take up the matter with the machine tool builder from whom he has previously bought machines, even though he does not contemplate the purchase of new machines. Manufacturers can often obtain suggestions of the greatest value in this way, and the service rendered always will be cheerfully given, whether the purchase of a new machine is contemplated or not.

Specific Examples

Several examples of work on which production has been increased by the efforts and experience of the sales engineer are given in Figs. 2 and 3. The eccentric packing rings shown at *A* in Fig. 2 were produced in large quantities by a manufacturer of gas engines, but the methods used were somewhat antiquated, so that as a consequence the number obtained from each operator was much smaller than was desired. The pots were cast as shown at *B* and were first bored, then placed on an eccentric arbor, turned eccentric and cut off by a gang of tools. From 25 to 30 rings an hour were produced by one operator running two machines. At the suggestion of a sales engineer employed by a manufacturer of horizontal turret lathes to whom the customer wrote for a better method of handling, the form of the pot was changed to that shown at *C*, having a beveled flange, *D*, which was gripped in a set of special chuck jaws, the projection, *E*, coming against the side of one jaw and acting as a driver. An eccentric turning device was applied to a standard make of turret lathe so that the pot could be turned eccentric, bored, and the rings cut off in one setting, using a single machine in place of two, as before, and turning out from 80 to 90 rings per hour.

The rear axle housing shown in Fig. 3 is of bronze and its machining by the old methods took from 1½ to 1¾ hours. By the installation of a new machine with special

equipment the work was done in 25 minutes complete. A horizontal boring mill had been formerly used for the work, with special bars and a fixture for holding the piece, but in the improved method a turret lathe was employed. As the work was both long and heavy, two finish rings at *B* were added to the casting and these were machined first on another machine. The work was then swung up, using these ends for centering, and was back-rested in rollers at the outer end. The surfaces, *C*, were bored simultaneously by a bar piloted in a spindle bushing to insure rigidity, and the larger diameters were bored by inserted tools in a piloted bar. The recesses, *D*, were cut by a special recessing tool, which cut them both at the same time and which was operated by a wheel controlled rack and pinion on the turret, which served to move an internal rod, on which two angular grooves were cut. These grooves meshed with sliding radial blocks in the body of the device and pushed the recessing tools in and out. Although this equipment was somewhat costly, the increased production obtained by its use more than paid for the outlay incurred.

Many other instances showing increased production fully as remarkable as those noted could be given, but the examples illustrated are sufficient to give an idea of the savings which can often be effected by the use of the experience and judgment of the sales engineer. To the progressive manufacturer who has undoubtedly developed the idea of specialization in his own work, it should be apparent that a sales engineer specializing for some years on certain classes of work on certain machines, is eminently fitted to suggest methods of handling which will be of value. Therefore, when the manufacture of new work is to be considered, or when methods of manufacture are not giving desired results it is to a customer's interest to take up the questions involved with a man who has made a special study of work of a similar character, so that he will obtain expert advice and suggestions and be prepared to compete with other men who have taken advantage of the services of the sales engineer.

Engineers Society of Western Pennsylvania

At a meeting of the structural section of the Engineers Society of Western Pennsylvania, held on Tuesday evening, March 2, Frederic H. Fay, consulting engineer, Boston, read a paper entitled "Protection of Metal Structures". At the regular monthly meeting, March 16, William H. Burr, professor of civil engineering, Columbia University, will give an address entitled "The Relation of Educational Training to Engineering Practice."

Steel Casting Business

"The steel casting business," it is stated by G. Muntz, vice president and general manager of the Tropenas Converter Co., New York, "is undergoing a considerable change at the present time, due mostly to the fact that foundrymen are beginning to realize that steel castings might be made cheaper and better if a little more careful consideration was given to the special requirements of the user. The old school of steel foundrymen is gradually dying out and is being replaced by men who, through superior technical training, are in a position to explain the reasons for metallurgical phenomena. The old school did not try to explain, but simply endeavored to compare each particular case to some other that had previously been encountered. This is why we witness in the better steel foundries the installation of laboratories and the employment of metallurgists who are able to turn out steel castings as they should be made."

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Detroit Representative: Mr. H. Temple Barber, Ford Bldg.
Chicago Representative: Theo. Geissman & Co., McCormick Bldg.
St. Louis, Mo., Representative: Heimbuecher Metal Products Co., 514 N. 3d St.

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Large manufacturing corporation, established 1850, location Canada, has a vacancy for a highly efficient business man as Secretary and Treasurer. Party must be able to invest at least $5,000 cash and give best of references as to ability and character. Contract with good salary guaranteed to right party. Investment absolutely secured. Answer in full or no attention paid. Address Box 344, THE IRON TRADE REVIEW, Cleveland, O.

NICKEL ANODE MAKER WANTED: Must be a thoroughly competent man; state experience and wages expected. John C. Wiarda & Co., 273 Green St., Brooklyn, N. Y.

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Positions Wanted

EXPERIENCED PATTERN MAKER wishes position as foreman; over 10 years in charge of shops employing from 20 to 100 men making patterns for gas and oil engines and electrical machinery. Broad experience with molding machines. Address Box 253, THE IRON TRADE REVIEW, Cleveland, O.

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STEEL FOUNDRY FOREMAN, 15 years' experience in open hearth, converter and manganese steel castings, both green and dry sand. Address Box 333, THE IRON TRADE REVIEW, Cleveland, O.

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